Beyond neocorporatism: new practices of collective decision making – Transdisciplinary case studies as a means for societal learning in sustainable development

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Abstract

The thesis sets the stage by introducing the concept of neocorporatism both focussing on economic development as well as on environmental problems. We illustrate how – at least in parts of the world – "major interest groups are brought together and encouraged to conclude a series of bargains about their future behavior". It can be shown that this negotiated form of policy making has an economically "neutral" effect (same economic growth like in liberal economies) but is at the same time socially less harmful (less poverty, less income inequality).

This concept is primarily based on observations at the macro-social level. Therefore, we ask how, at a meso-level, these negotiated or deliberative forms of policy making look like and what role science plays herein. We will introduce a methodological framework developed in the last decade at the ETH Zurich, the Transdisciplinary Case Study (TdCS) as a potential means to initiate and foster societal learning in sustainable development. This approach will be illustrated with three examples, (i) a regional learning process among traditional industries at the fringe of the urban area in Pre-alpine Appenzell Ausserrhoden, Switzerland; (ii) a collaborative planning process for sustainable development in a region where tourism plays a dominant economic role: the Seychelles; and (iii) a learning programme in environmental sciences at the ETH Zurich.

We discuss the new role for research in the TdCS and compare our experiences in collective decision making with similar discussions in planning sciences, democracy theory and risk assessment. Using our TdCS as an example, we discuss the concept of a functional-dynamic collaborative learning process. We conclude with some reflection on the following questions: can TdCS be understood as a neocorporatist arrangement at a meso-level and are these deliberative forms of policy making possible as well in Anglo-Saxon regimes?

Kurzfassung

Das erste Kapitel berichtet den Forschungsstand im Bereich des «Neokorporatismus». Ich referiere unterschiedliche Operationalisierungen und darauf basierende empirische Studien, die gezeigt haben, dass «Neokorporatismus» im Vergleich mit anderen Regimetypen einen ökonomisch neutralen Effekt hat, aber sozial günstiger ist (weniger Armut, geringere Einkommensungleichheit). Im Bereich der Umweltpolitik zeigen viele Studien, dass neokorporatistische Regelungssysteme auch positive Effekte auf z.B. Emissionen haben können. Auf der Grundlage dieser Überlegungen auf Makroebene, leite ich meine konkreten Forschungsfragen ab. Ich stelle dabei die Frage auf, wie solche neokorporatistische Verhandlungsformen auf einer Meso-Ebene im Bereich der nachhaltigen Entwicklung konkret aussehen können, wobei drei unterschiedliche Teilaspekte untersucht werden: (i) die Kooperation von traditioneller Industrie, Verwaltung und Hochschule im Rahmen von regionalen Clustern im agglomerationsnahen, ländlichen Raum; (ii) die Kooperation unterschiedlicher Akteurgruppen im Bereich des nachhaltigen Tourismus auf einer Insel als traditioneller Tourismusdestination; sowie (iii) die Möglichkeiten einer Hochschullehrveranstaltung, die für solche Kooperationen erforderlichen Kenntnisse und Qualifikationen von Wissenschaftern zu vermitteln.

Das zweite Kapitel berichtet in geraffter Form die in den Fallbeispielen zur Anwendung gelangte Methodik, den transdisziplinären Fallstudienansatz. Skizziert werden einerseits das methodische Gerüst, welches sich aus dem Modell eines strategischen Entscheidungsprozesses ableitet und verschiedene analytische Methoden systematisch miteinander verknüpft sowie die Organisationsform, welche auf allen Projektebenen eine gleichberechtigte Zusammenarbeit von Hochschule und Praxis und somit transdisziplinäre Forschung ermöglicht.

Im dritten Kapitel präsentiere ich die Forschungsarbeiten eines grossen mehr als zweijährigen Forschungsprojektes, das einen gemeinsamen regionalen Lernprozess der Traditionsbranchen Textil, Sägerei und Milchwirtschaft zusammen mit der kantonalen Verwaltung im Kanton Appenzell Ausserrhoden initiiert hat. Aufbauend auf dem Konzept des regionalen Clustering, wird in dieser Studie gezeigt, wie lokale Akteure

unterschiedliche Formen der Kooperation einschätzen und welche Rolle bei der Ausgestaltung bzw. Initiierung solcher Cluster der transdisziplinäre Fallstudienansatz als analytisch-systematische Methodik leisten kann. Die Situation der drei untersuchten Branchen zeigt sich in der Analyse deutlich unterschiedlich, da diese sowohl extern in verschiedenen nationalen wie internationalen Marktkontexten und andererseits untereinander unterschiedlich zueinander stehen (vertikale bzw. horizontale Konkurrenz bzw. Kooperation). Nichtsdestotrotz konnten durch die Studie einige wichtige Prozesse angestossen werden, die zu verschiedenen Nachfolgeprojekten führten.

Im vierten Kapitel berichte ich über eine sechsmonatige Studie, die auf den Seychellen durchgeführt worden ist und Möglichkeiten einer nachhaltigen Tourismusentwicklung ausloten half. Die Studie situiert sich in einer nun schon dreissigjährigen Diskussion zu alternativen bzw. nachhaltigen Formen des Tourismus und illustriert eine systematisch-analytische Vorgehensweise mit dem transdisziplinären Fallstudienansatz bei der Planung neuer bzw. neu gestalteter Tourismusangebote. Die Studie zeigt, wie die dazu erforderlichen Kooperationen zwischen der nationalen bzw. regionalen Verwaltung, den verschiedenen Tourismusanbietern, der direkt betroffenen Bevölkerung sowie den aktuell die Insel besuchenden Touristen initiiert, verstärkt und zielgerichtet für Entwicklung und Bewertung unterschiedlicher Zukunftsoptionen eingesetzt werden können. Eine nachhaltige Form des Tourismus zeigt sich dabei für die Seychellen als erfolgversprechende Option, die auch von der lokalen Bevölkerung getragen wird. Die im Rahmen des Projektes erarbeiteten Ergebnisse werden in Nachfolgeprojekten gezielt vertieft und umgesetzt.

Das fünfte Kapitel präsentiert die Möglichkeiten, wie bei solchen neuartigen Formen der wissenschaftlichen Forschung erforderliche Kenntnisse und Qualifikationen in einer Hochschullehrveranstaltung vermittelt werden können. Grundlage bildet hierbei die mehr als zehnjährige Praxis der transdisziplinären Fallstudie in der angewandten Lehrforschung, in der ich von Beginn in Konzeption, Aufbau und Weiterentwicklung massgeblich mitbeteiligt war. Diese Lehrveranstaltung stellt erhöhte Anforderungen an die verantwortlichen Lehrpersonen wie die involvierten Studierenden, was ich detailliert diskutiere. Der Lehransatz zeigte sich über die Jahre als sehr erfolgreich, wobei ich auch kritische Punkte offen anspreche.

Im sechsten Kapitel diskutiere ich die in den transdisziplinären Fallstudien gemachten Erfahrungen vor dem Hintergrund (a) der neuartigen Herausforderungen an die wissenschaftliche Forschung bzw. (b) den auftretenden Schwierigkeiten der Praxis-Hochschul-Kooperation. Zum Ersteren zeige ich, dass bei der transdisziplinären Forschung sowohl die Autonomie der Forschung wie aber auch der Praxis auf dem Spiel steht. Zum Letzteren arbeite ich heraus, dass ein dynamisch-funktionales Verständnis der Kooperation von Hochschule und Praxis erforderlich ist, welches den gezielten Einsatz unterschiedlicher Instrumente bzw. Methoden über die Dauer eines Projektes erfordert.

Zu Schluss der Arbeit schliesse ich den Kreis indem ich die Diskussion auf den zu Beginn skizzierten Rahmen des Neokorporatismus zurückführe. Ich diskutiere inwieweit der transdisziplinäre Fallstudienansatz als Konkretisierung neokorporatistischer Regelungssysteme verstanden werden kann. In einem breiten prozessorientierten Verständnis ist dies aus meiner Sicht durchaus möglich, wobei im Gegensatz zu klassischen korporatistischen Arrangements mehr und unterschiedlichere Akteurgruppen einbezogen werden sowie in einem nicht hierarchischen und lokal situierten Feld aufeinander treffen. Mit Rückgriff auf die Literatur schliesse ich, dass sich solche verhandlungsorientierte Politikformen auf internationaler Ebene verstärkt zeigen, wenn sich auch die konkrete Ausgestaltung dabei unterschiedlich darstellen.

Overview

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I Introduction

The comparison of *e.g.* societies, nations, and democracies normally implies the distinction of several different groups, i.e. classification and grouping of similar entities. This allows comparing between different groups of countries instead of individual countries. This can be considered a classical approach to increase statistical power in analysis and to reveal potential explanations for certain outcomes, like *e.g.* economic success. Questions that are normally asked in such a context are as follows: which countries are more successful with respect to economic growth or – just as important but less researched – with respect to distribution and *e.g.* income equality (for these two traditions in measuring economic performance, see Hicks and Kenworthy, 1998, p. 1632).

In the last decades several classifications have been proposed (for an overview, see Bornschier, 2005b, pp. 340-342; Bornschier, 2005c), like *e.g.* the 'three worlds of welfare capitalism' ('socialist', 'liberal' and 'conservative'; see Esping-Andersen, 1990); the distinction of 'majoritarian' *vs.* 'consensus' democracies (Lijphart, 1984); and the different varieties of capitalism proposed by Hall and Soskice (2001; 'liberal market' *vs.* 'coordinated market'). They all share the feature to differentiate between different degrees of interest mediation in society or societal bargaining processes, *e.g.* what role the state plays in market economy or how different interest groups are involved in policy making. In the following, one recent contribution by Bornschier (2005a, 2005b) will be sketched. Whereas especially the dimension of 'neocorporatism' will be discussed (see *e.g.* Schmitter, 1974; Schmitter and Lehmbruch, 1979).

1 Neocorporatism as one regime type in developed democracies

Bornschier distinguished between five different cultural patterns of democracies (2005b, pp. 338-339): Anglo-Saxon, North-European Scandinavian, Central-Western European, Latin-Mediterranean and East-Asian. His distinction was based primarily on the degree of 'neocorporatism' (Siaroff, 1999) – called by Bornschier 'negotiated capitalism' with reference to Hicks and Kenworthy (1998) – supplemented

by Anglo-Saxon cultural heritage and the entrepreneurial state. In the following, we focus especially on the dimension of 'neocorporatism' as this– according to Bornschier (2005b) – is the essential one and has been applied as well in non-economic fields, like environmental policy making.

1.1 A structural and a process understanding

Molina and Rhodes (2002) while reviewing the concept of 'corporatism' cite Shonfield (1965) as one of the first authors after World War II taking up the term again. Shonfield (1965, p. 231) stated that in corporatist economies, "major interest groups are brought together and encouraged to conclude a series of bargains about their future behaviour". He freed the term from ideological connotations connected to fascism and therefore it was later normally referred to as 'neocorporatism'; or democratic, societal, liberal corporatism (see *e.g.* Bornschier, 2005b; Bornschier, 2005c; Lijphart and Crepaz, 1991; Siaroff, 1999). In the 1970s, Schmitter and Lehmbruch further developed the concept (Schmitter, 1974, 1979; Schmitter and Lehmbruch, 1979; Lehmbruch, 1979). The former focussed more on structural aspects of interest representation whilst the latter stressed the process character seeing "corporatism as an institutionalized pattern of policy formation in which large interest organizations cooperate with each other and with public authorities" (Lijphart and Crepaz, 1991, p. 235; Molina and Rhodes, 2002, p. 307). From the mid 1970s onwards the concept has been empirically operationalized and tested in several studies focussing on developed capitalist democracies, namely the members of the Organization for Economic Cooperation and Development, OECD (*e.g.* Lijphart and Crepaz, 1991; Hicks and Swank, 1992; Hicks and Kenworthy, 1998; Siaroff, 1999). According to Molina and Rhodes (2002, p. 324) since the 1990s neocorporatism "can best be understood in terms of networked form of governance", "a distinct governance mode beyond hierarchy and market". Yet this process focus has often been neglected and empirical applications have mostly focussed on structural aspects (Molina and Rhodes, 2002).

1.2 Measured differently and yielding different results

Lijphart and Crepaz (1991) combined twelve existing measures for corporatism in a new composite one that has later been used and further developed by many scholars. It needs to be noted that this often cited

reference work – 71 up to January 2006 documented on Web of Science – has serious lacks as regards transparency. Neither were the twelve original measures documented nor was the aggregation procedure clearly described. It was later criticised as being an atheoretical aggregation (see *e.g.* Neumayer, 2003). According to Lijpart and Crepaz, Austria ranks first, Norway second, Sweden third, the Netherlands fourth; and New Zealand, third from last, Canada next to last, the US rank last on the corporatism scale.

Hicks and Swank (1992) used a set of twelve indicators, applied a factor analysis and found strong factor scores for a so called 'left corporatism' with 'union strength', 'union centralization', 'left voter mobilization' and 'left party-led government' (p. 662; detailed explanations on p. 671). Here, Sweden ranked first, followed by Norway and Austria; Ireland ranked last, US next to last. In his later works Hicks refers to this score as 'social democratically (and politically) tilted index' in contrast to the 'societally tilted index' (Hicks and Kenworthy, 1998, p. 1641) of Lijphart and Crepaz (1991). Hicks and Kenworthy (1998) included these two different scores with a broad set of indicators, applying again factor analysis resulting in two dimensions: 'neocorporatism' and 'firm-level cooperation'. This new score for neocorporatism integrated the two former ones and supplemented it with information on *e.g.* the existence of national business confederations, wage negotiations influenced by unions, and active coordination between state and interest groups (*ibid.*, pp. 1636-1637). Here (see Table 5 on p. 1649) Sweden ranks first, Norway second, Austria third; and the US last, Canada next to last, Ireland last but two.

Siaroff (1999) summarized twenty-three different studies – including most of the twelve covered by Lijphart and Crepaz (1991). All individual results were documented but recalibrated into five-point scales and the arithmetic mean of all scores is computed (Siaroff, 1999, pp. 180-182, p. 198). Siaroff mentioned three 'problematic' cases when comparing across the studies – namely Switzerland, Japan, and France – and discussed them in some detail (*ibid.*, pp. 183-187). Therefore, he questioned the one dimensionality of the existing scores offering as an alternative 'integration' (*ibid.*, p. 189): "a long-term co-operative pattern of shared economic management involving the social partners and existing at various levels". Likewise, Siaroff introduced again a process understanding of corporatism (Molina and Rhodes, 2002). For this new score, Siaroff used a summary index of eighth

measure, like *e.g.* level of strikes, nature and goals of trade unions, extent of co-determination in the workplace, nature of wage setting, and general nature of public-private interaction (Siaroff, 1999, p. 194; later applied by *e.g.* Lijphart, 1999; Neumayer, 2003). In this new score, Austria, Norway and Sweden ranked first; on the other end, he found Canada, Greece, Spain, the UK and the US. Despite the new and adapted focus, he computed a correlation of 0.91 between the integration scores for the mid 1990s and the mean of the twenty-three different neocorporatism scores (*ibid.*, pp. 198-199).

It is bewildering to see how this rather elusive concept has been measured always differently but producing similar ranking orders of developed countries. Nonetheless, the studies produced a number of remarkable results with respect to development over time and different outcomes.

2 Increased polarisation in a new societal model?

2.1 Neocorporatism successful and sustaining

In his analyses, Bornschier (2005b) illustrates that the regime of negotiated capitalism has been rather stable between 1960s and mid 1990s (*ibid.*, p. 344); and in fact an even more pronounced polarisation between Anglo-Saxon regimes and the rest of the countries can be observed in recent times (*ibid.*, p. 345). The moderate overall weakening of neocorporatism can be largely explained by the Anglo-Saxon cultural heritage where the already low level decreased constantly (*ibid.*, p. 349). As regards this rather stable situation, Bornschier offers a seminal explanation referring to his 'Theory of Conflictive Evolution' (*ibid.*, p. 350; see as well Bornschier, 1988; Bornschier, 1996). According to this theory, the competition in the world market between different socio-economic regimes will drive increased convergence, but only if some of the competing market actors are not performing well. Reviewing evidence from different studies, Bornschier illustrates that in fact neocorporatism is neutral regarding economic growth; results in less income inequality and less poverty through increased welfare measurements (*ibid.*, p. 352; see as well Hicks and Kenworthy, 1998; Lijphart, 1999; Wilensky, 2002). Consequently this very success explains why neocorporatist regimes still persist.

2.2 The move towards a new societal model

According to an evolutionary understanding of modern societies, a given society is in constant flow and adapts in different areas to innovate and retain *e.g.* economic prosperity. Following the ideas of Carlota Perez (1983; 1985) Bornschier stresses the discontinuous character of this societal change process (see *e.g.* Bornschier, 2005a; Bornschier, 2005c; Bornschier, 1988; Bornschier, 1996) and states how crucial developing mismatches are between *e.g.* technological innovation and subsequent socio-institutional adaptation (Bornschier, 2005a, pp. 505; Bornschier, 2005c; Perez, 1985). In fact technological innovation and societal change processes are interwoven, the latter being the condition for the implementation of the former (Bornschier, 2005a, p. 518; Bornschier, 2005c). This understanding is similar to the idea of regional learning systems, stressing the importance of novel interactive collaboration processes between state agencies, universities and industry for continuous innovation (see *e.g.* Morgan, 1997; Moulaert and Sekia, 2003; Moulaert and Nussbaumer, 2005; Scholz and Stauffacher, 2006; Werle, 2005).

2.3 Different adaptation process in the new societal model for neocorporatist and Anglo-Saxon regimes

The persistence of neocorporatist regimes has been seriously threatened by the changing societal model of increased market sphere visible since the 1970s (Bornschier, 2005b, pp. 353; Bornschier, 2005c). Anglo-Saxon regimes normally adapt more easily and directly to a changing world due to their institutional specifities (*e.g.* majoritarian electoral process, see *ibid.*, pp. 357). On the other hand, neocorporatist regimes are generally more rigid due to their strong societal cohesion and had therefore to follow a different path (*ibid.*, p. 358). According to Bornschier, the supranational integration in the European Union (EU) has been decisive here. On the level of the EU, specific 'elite actions' secured the timely reaction by integrating the market (European Single Market), following a progressive technology and education policy (*ibid.*, p. 359). Bornschier continues by illustrating how EU countries have been actually as successful as Anglo-Saxon regimes in economic growth (*ibid.*, pp. 362-366). This again is an indication that no convergence of political regimes is to be expected (*ibid.*, p. 367).

3 Neocorporatism and environmental performance

To continue our discussion of neocorporatism, we want to focus on environmental problems, as this is in line with our subsequent analysis of sustainable development processes. Proponents of sustainable development emphasize the involvement of different stakeholder groups from public and private sphere in an interest negotiation process to organize and manage the ongoing inquiry into efficient resource use in order to keep systems within their functional limits and to respect the needs of future generations (see *e.g.* Laws *et al.*, 2004). This resembles the situation of corporatist regimes where interest groups are brought together in a series of bargains about their future behavior.

3.1 Inclusion of environmental organizations in neocorporatist arrangements not foreseen but certainly possible and promising

In most of the cases, studies on neocorporatism focused primarily on economic development and the idea to include non-economic interest groups like environmental organizations was not foreseen (Downes, 1996, p. 179; he referred to Schmitter, 1989 as one of the few exceptions). In a thorough analysis Downes proposed some major reasons for this non-inclusion (*ibid.*, pp. 179-181). (1) As the state did not depend on the cooperation of non-economic interest groups for the implementation of policies, they were not involved. (2) Non-economic interest groups were only poorly organised, could not ensure compliance to the outcome of agreements and were therefore not allowed to participate in corporatist arrangements. Yet, as Downes illustrated, some environmental organisations have certainly potential influence and are strongly organised. Following Lehmbruch in his process understanding of neocorporatism, Downes then concluded that a stakeholder process for sustainable development "resembles a neo-corporatist interest intermediation structure" (*ibid.*, p. 182). Against this, Scruggs (1999, p. 4) cited advocates of environmental reforms having two major criticisms against neocorporatist institutions: dominant economic interest groups are hostile to environmental interests and neocorporatist institutions are not able to incorporate ecological issues. Yet, as Scruggs detailed (*ibid.*, p. 5) industry probably favours neocorporatist arrangements against direct environmental regulation; neocorporatist institutions can provide a framework for effective learning; and have the "ability to pursue public goods". Scruggs concluded that

"several factors seem to suggest that corporatist institutions may be effective ways to regulate environmental pollution" (*ibid.*, p. 8).

3.2 Empirical results contradictory

King and Borchardt (1994) – though not directly interested in corporatism but more in effects of left party power – found reduced pollution for corporatist regimes (*ibid.*, p. 239). Crepaz (1995) found a negative correlation between degree of corporatism and pollution levels when controlling for per capita income, GDP growth, per capita consumption of energy, and political dominance of social democrat party. Jahn (1998, p. 120) found "that corporatism has a highly significant positive effect on environmental performance". This effect remained in multivariate regression when controlling for geographical size, size of industrial production, population density, and Gross National Product (*ibid.*, p. 125). Scruggs (1999; 2001) found as well a positive correlation between neocorporatism and environmental performance from the 1970s to 1990 (Scruggs, 1999, p. 17). Positive effects remained in multivariate regression models controlling for *e.g.* energy use, nuclear power, income per capita, growth per capita. Scruggs (2001) re-examined and confirmed these results using data from a more recent time period (1980-1995). Matthews (2001b) analysed changes in fuel filth consumption and found a significant but modest effect of corporatism in multivariate analyses. She concluded that "corporatist institutions are more adept at implementing policies that serve the broader interests and effectively overcome potential problems of collective action" (*ibid.*, pp. 495-496).

Neumayer (2003, p. 208) criticised these studies mainly for three reasons: the number of observations was small, often only cross-sectional data were used, and just ordinary least square estimation techniques applied. Neumayer utilized advanced statistical techniques exploiting both fixed-effects and random-effects. He drew on panel data covering the time period 1990-1999. Additionally, Neumayer (*ibid.*, pp. 211-212) measured corporatism effect by Siaroff's (1999) indicator which he rates as superior to the one by Lijphart and Crepaz (1991) utilised in the other studies. In contrast to the other studies, he found that in "most cases, the corporatism variable tested insignificantly" and concluded that it "is probably a myth to believe that corporatism is good for the environment" (*ibid.*, p. 219). On the

other hand, he found a robust association between lower pollution levels and green or left-libertarian parliamentary strength (*ibid.*, p. 218).

3.3 Aggregated data level not enough

Most probably these studies have actually failed to explain if and how environmental performance can be improved by a multi-stakeholder interest negotiation process. To this end, a more disaggregated view is certainly necessary and helpful (Clemens and Cook, 1999, p. 461). This view has been stressed by Matthews (2001a, 2001b) claiming that the actual mechanisms of neocorporatist institutions and environmental policies are not well understood.

This can be well illustrated by the study of Lahusen (2000) on 'cooperative environmental regulation' in France, Germany, Great Britain und the US. 'Cooperative environmental regulation' – understood as "any working relationship between the state and society […] which aims to prepare, produce and implement commonly supported measures of environmental pollution abatement or prevention" (*ibid.*, p. 255) – exists in all these four countries. Yet it takes four distinctive forms: "a deliberative consensus model in Germany, a rationalist style of etatism in France, a pragmatist compromised model in Great Britain and a pluralist and adversarial competition style in the USA" (*ibid.*, pp. 257-258). Hence, Germany can be understood as a further case for the importance of neocorporatist regime in environmental policy. Yet even more, this study showed that in fact multi-stakeholder interest negotiations are probably not only prevalent in neocorporatist regimes but as well in the Anglo-Saxon cultural heritage. Still it needs to be examined at a meso-level if and how neocorporatist regimes actually work.

4 Research questions: researching neocorporatism at the meso-level

We have seen that neocorporatist arrangements have been economically successful and have persisted. Yet, it is to be expected (1) that neocorporatism will itself need to be adapted within the new societal model and has to follow a less hierarchical and centralised approach (or already has), (2) that neocorporatism will need to incorporate more and different

interest groups when addressing environmental problems, leading probably again to different institutional forms and (3) an integrated framework has to develop where economical, societal as well as environmental performance can be tackled at the same time. On this background, our study aims to answer the following main question: how can neocorporatism look like at a meso-level and is it successful in sustainable development? These questions will be fathomed in three different fields:

(1) How are negotiation processes and collaboration between and within different industries and the state organized on regional level; and what role plays science therein? To answer this question, we will refer to a traditional approach in regional economics and economical geography, that of regional clustering or more precisely, localized and regional learning. As these cooperations are especially needed at the urban fringe, we will research this in the Canton of Appenzell Ausserrhoden in Switzerland.

(2) How are negotiations processes organized in a prototypical multi-sectoral field, crosscutting different state ministries as well as a broad range of industries, namely the field of tourism? We will especially focus on, how such negotiation processes can be supported applying systematic and analytical approaches, like stakeholder based multi criteria analysis. To answer these questions, we will refer to the relatively recent notion of sustainable tourism development which has been especially important in regions where tourism plays a dominant role, like *e.g.* on Small Island Development States (SIDS). Here the Seychelles are our research area.

(3) From the above it becomes evident that the role of science is certainly going to be different than traditionally. This leads to the question, how the university as learning institute can acquaint students with these new challenges? Again, we can base on existing work, here in the field of educational sciences, namely of project based learning based on a socio-cultural construction of reality.

Finally, we will deal with the question of convergence *vs.* polarisation: are corporatist arrangements impossible in the Anglo-Saxon cultural heritage or might we observe a 'deliberative' turn both in neocorporatist and Anglo-Saxon regimes?

II TdCS as methodological frame for collaborative learning processes in sustainable development

Answering these questions, we will make use of a core methodology developed at the ETH Zurich to research and develop complex societal problems where environmental issues are at stake, the so called Transdisciplinary Case Study (TdCS). Here we only give a short presentation of its main principles; within the subsequent case studies, we will present each time some more specific details.[1]

1 Methodological framework: an analytical approach to collaborative planning in sustainable development

Our approach goes over and beyond most collaborative approaches that focus mainly on the participatory process (*e.g.* Forester, 1989; Healey, 1998; Innes, 1998; Sager, 1994). However, they give no guidance how to tackle analytically the substantive decision problem at hand (Gregory *et al.*, 2005). Hence, our approach is a decision aid method, giving stakeholders the possibility to learn more about the decision problem in a structured and transparent way (Belton and Pictet, 1997; Gregory *et al.*, 2005; Joubert *et al.*, 1997; Lahdelma *et al.*, 2000; McDaniels and Gregory, 2004). Following a model of a strategic decision process (see Mintzberg *et al.*, 1976), our general framework covers the following steps: analysis of the present situation, identifying and describing the decision problem; developing options (or scenarios, alternatives) of future development; evaluating these options using multiple criteria referring both to expert estimations and stakeholder preferences; and elaborating strategies for future action (Figure 1; see Scholz and Tietje, 2002, pp. 268-269).

[1] For a more detailed discussion of *e.g.* ontology, epistemology, and validity of the TdCS, please refer to Scholz *et al.*, 2006; Scholz and Tietje, 2002.

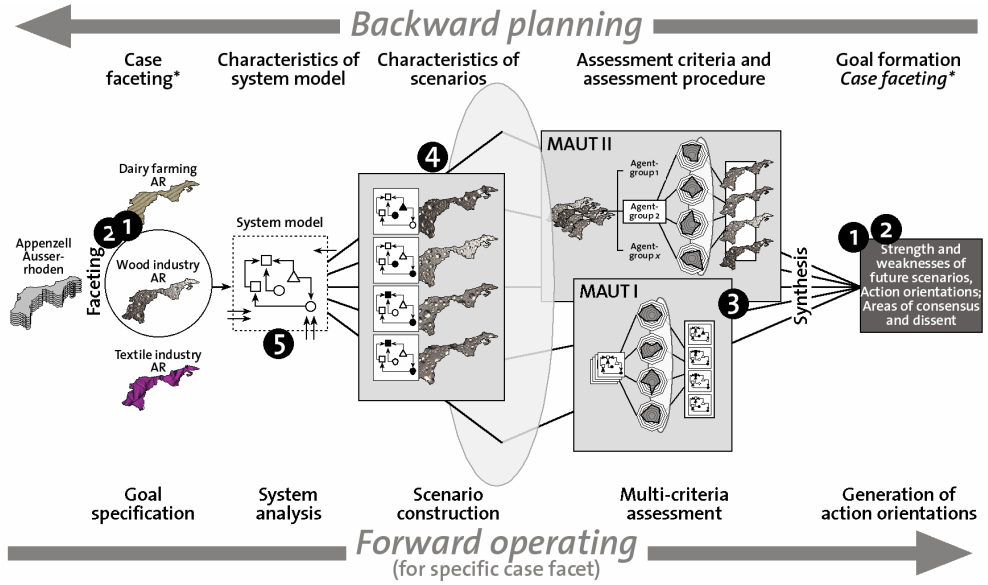

Figure 1. TdCS methodology for the case study "Appenzell Ausserrhoden: Environment, Economy, Region" (Scholz et al., 2006).

All steps are conducted with respect to the concept of "backward planning" (Scholz and Tietje, 2002, p. 267). This means that they are functionally determined by the goals defined and by the steps they refer to. "Backward planning" and "forward operating" are performed in an iterative process in which the previously elaborated framework is constantly reflected and adopted on the basis of new insights. "Backward planning" helps to ensure the goal orientation and the functional interplay of the different analytical steps. Each method is embedded in a structured set of methods, and its functions are determined by the overall goal, input, expected output, etc. of the case study process (Wiek *et al.*, 2006). Table 1 presents the analytical steps of the TdCS framework.

Table 1. The major analytical steps of the TdCS.

Step	*Description*
(1) Defining a guiding question (Scholz and Tietje, 2002, pp. 84-86, pp. 268-9)	The research team in consultation with stakeholders defines the guiding question
(2) System Analysis (Scholz and Tietje, 2002, pp. 48-54, 87-88, 241-6)	The analysis of the system characteristics enables to determine important structures and dynamics of the case. Through literature review, expert interviews and surveys, we describe the current state of the case. We develop a set of 10 to 15 impact factors considered relevant and sufficient to describe the current state. Impact matrixes, system grids, Mic-Mac-Analysis, system graphs deepen our understanding of the system and its dynamics (for details, see Scholz and Tietje, 2002).
(3) Creating scenarios using Formative Scenario Analysis (FSA) (Scholz and Tietje, 2002, pp. 105-116; see as well Wiek *et al.*, 2006)	We define two to three levels of development for a sub sample of 8 to 12 impact factors. A scenario then is defined as a complete combination of levels of all impact factors. Using consistency analysis those scenarios exhibiting high inconsistency scores are discarded. The final selection of scenarios is done jointly with a group of stakeholders.
(4) Multi-criteria Analysis (MCA) (Scholz and Tietje, 2002, pp. 143-173, 197-224)	We derive a small set of six to twelve evaluation criteria in consultation with stakeholders. We apply two different approaches of MCA: (i) calculations based on data, literature and expert interviews (data based evaluation MCA I); (ii) stakeholder groups – at least six persons each – provide assessments (stakeholder based evaluation, MCA II). MCA II evaluation is made in two steps: overall 'holistic' and still intuitively, but using the criteria from the MCA I.
(5) Results discussion, strategy development (Scholz and Tietje, 2002, pp. 114-115, 268-269)	We discuss jointly with stakeholders the results of the above steps in workshops and develop ideas for future action.

2 Organisational framework: a true partnership and a mutual learning process among society and science

Our approach stands in line with a long tradition of – sometimes overlapping – concepts like "advocacy planning" (Davidoff, 1965; Forester, 1994), "participatory planning" (Smith, 1973), "communicative planning" (Forester, 1989; Innes, 1998; Sager, 1994; Willson, 2003), "collaborative planning" (Healey, 1998, 1999), and "deliberative planning" (Forester, 1999; Sager, 2002). Hence, our use of the term 'collaboration' is deliberate

though many others are used in the field. Thereby we would like to stress the importance of "a true partnership" in a joint and mutual learning process – with reference to the seminal idea of a "ladder of citizen participation" introduced by Sherry Arnstein (1969). We are systematically integrating knowledge and values from research and society and therefore denote our design as 'transdisciplinary case study'. The term transdisciplinary refers to a new form of knowledge production whereby a mutual learning process is aspired (Scholz *et al.*, 2000). Transdisciplinary research (Scholz *et al.*, 2000)

- deals with relevant, complex societal problems,
- supplements traditional disciplinary and interdisciplinary scientific activities by integrating actors from outside academia,
- and organizes processes of mutual learning among science and society.

To implement the concept of transdisciplinary research, each layer in the organization chart of the TdCS is composed of scientific and case institutions or agents, respectively. The project is co-lead by a representative from science and practice, both of which have equal rights and responsibilities. The steering group of the case study, which is strongly involved during the entire project, defines the project framework and continuously oversees project quality. On an operational level, project groups conduct the major part of the work. These groups intensively collaborate with reference groups, composed of representatives of relevant stakeholder groups. Various scientific and case experts advise and support the project. The advisory board, which meets about three to five times during the case study, is an institutionalised form of this support.

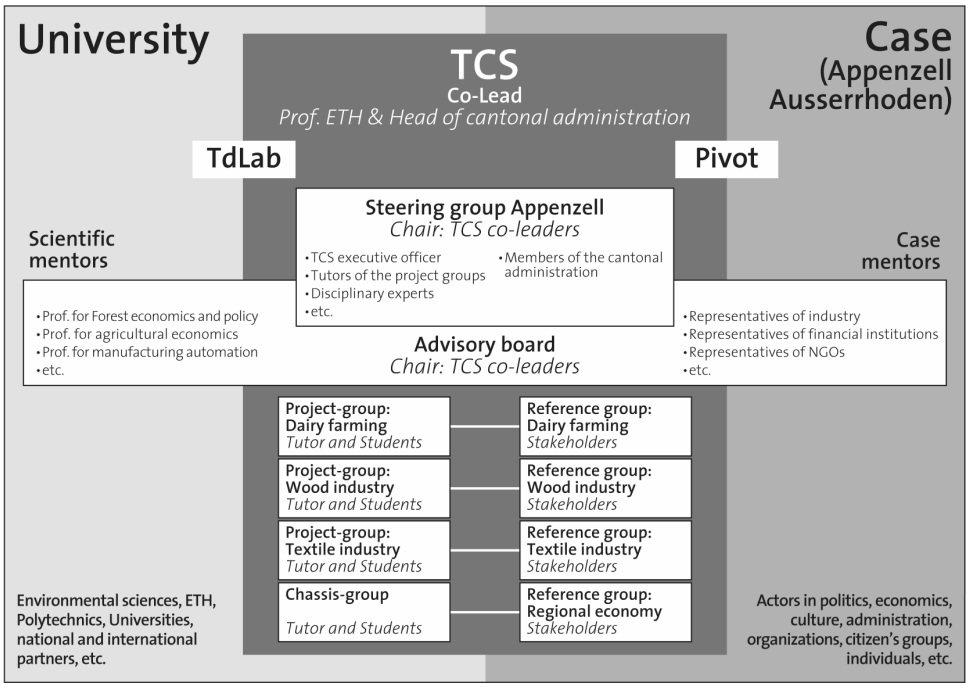

Figure 2. Organization chart of the TdCS for the case study "Appenzell Ausserrhoden: Environment, Economy, Region" (Scholz et al., 2006)

III Case study 1: Managing transition in clusters: Area Development Negotiations as a tool for sustaining traditional industries in a Swiss pre-alpine region[2]

1 Introduction

During the last fifteen years many authors have discussed the phenomenon of regional clustering of industries (Amin and Thrift, 1994; Storper, 1995; Lorenzen, 2001; Malmberg and Maskell, 2002; Scott and Storper, 2003; Newlands, 2003) or have provided examples of successful regional developments from the perspective of clustering and regional learning of industries (*e.g.* Cooke and Morgan, 1998; Arndt and Sternberg, 2000; Amdam, 2003; Lundequist and Power, 2002; Schamp, 2005; Chapman, 2005). However, a critical discussion about the concept of clustering, the vagueness of its definition, and on the critical success factors of clusters has emerged (Martin and Sunley, 2003; Benneworth *et al.* 2003; Hassink and Shin, 2005). Some argue that clustering is a rather normative approach and that the empirical evidence of clustering is weak (Martin and Sunley, 2003). A much broader view is offered by economic geographers with the concept of regional learning emphasizing the interactive character of innovation processes at a regional level (*e.g.* Morgan, 1997; Moulaert and Sekia, 2003; Moulaert and Nussbaumer, 2005). This chapter does not contribute to this already extensive debate. Rather, the present chapter contributes to an understanding of the interactive character of regional learning, investigating prerequisites of such processes (i.e., the implied transition processes and their management; cf. Rotmans *et al.*, 2001; Vollenbroeck, 2002; Wiek *et al.*, 2006) and introducing a method that can be used to promote and initiate clustering or regional learning processes. To this end, we will deal with the following questions:

(1) How do key stakeholders in different traditional industries in the Swiss pre-alpine region of Appenzell Ausserrhoden (AR) perceive and evaluate

[2] This chapter is based on a paper written in collaboration with Roland W. Scholz

different forms of cooperation and the building of regional clusters? What role do the different background conditions for different industries play with respect to horizontal and vertical competition?

(2) How can the strategy formation and transition of traditional industries be supported by the method of Area Development Negotiations (ADN; Scholz and Tietje, 2002) as part of a regional learning process?

As the AR region lies at the peripheries of an agglomeration, the study also provides some insight into whether traditional industries can be maintained at the fringes of agglomerations in Central Europe.

We will first examine some of the prerequisites of clustering that are of importance for understanding key stakeholders' perceptions and evaluations of cooperation. We will then sketch the rationale of our own approach, the ADN method, describing its practical methodology when presenting the AR study. Finally, we will detail our experiences in the process.

1.1 What can promote cooperation and clustering among Small- and Medium-sized Enterprises (SMEs) in traditional industries?

According to Porter (1990, p. 199) a "cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by communalities and complementarities." Clusters develop in a tension between competition and cooperation and are conceived of as interconnected companies with a high degree of collaboration and are considered an essential success factor particularly for Small- and Medium-sized Enterprises (SMEs). Porter's idea of clustering emerged from company business strategies and not from economic concepts such as 'post-Fordism', 'flexible specialization' or 'modes of regulation' (Martin and Sunley, 2003). Though companies work in domestic rivalry (*e.g.*, in acquiring good labour and securing demand) and rivalry is seen as a motor of innovation and competitiveness, domestic cooperation can be considered advantageous when the aim is "to attain and sustain global competitive advantage" (Asheim, 1996, p. 381). The rationale of cooperation can be seen in *cost reduction* (*e.g.*, shared infrastructure, reduced transaction costs etc.) or *knowledge spillovers* (i.e., proximity leading to various exchanges of information and knowledge, see Malmberg and Maskell, 2002). However, the ambivalence between cooperation and competition might be seen differently from the perspective of *horizontal or vertical competition*.

Whereas companies competing on different levels of the production chain, such as companies in a supplier-buyer relationship, generally consider the upgrading of a spatially proximate enterprise as advantageous, this is not often the case for competitors on the same level. Despite this, there is still some interest in regional clustering from a horizontal perspective because of the availability of local knowledge, common infrastructure, and joint lobbying on policy issues. This leads directly to the institutional embedding of industries. Here we distinguish between formal institutions such as associations, universities, and suppliers, and informal institutions such as tacit knowledge or social conventions such as commitments to a certain culture of trust or rules of trade and contract. More generally speaking, the social capital available in a region plays a crucial role for companies acting under similar market conditions.

Based on this last issue, some authors such as Boschma (2005a) go beyond geographical proximity and also consider appropriate degrees of social, organizational and cognitive proximity as supportive for clustering. This perspective is very much related to the concept of *learning regions* (Florida, 1995), which considers firm networks and supplier systems as resources of innovation. Thus, the success factors of learning regions have geographical and physical ("separation in space and relations in terms of distance", Torre and Gilly, 2000, p. 174) aspects, as well as a relational (i.e., socio-psychological), organizational side. The latter refers to "the cultural proximity of actors, i.e. their sense of belonging to the area, their capability of interaction and the sharing of common values" (Capello and Faggian, 2005, p. 79).

Learning is a prerequisite of innovation and is particularly important for companies in traditional industries (*e.g.*, the textile industry) based in highly developed countries. This is because these companies cannot compete through lower prices but only through manufacturing innovative products on the top of the production pyramid with new technologies. Territorial or regional innovation systems (Moulaert and Sekia, 2003; Moulaert and Nussbaumer, 2005) are of special interest here because declining industries require new impulses induced by both interactive learning processes (Morgan,1997) and by, for example, the networking of resources, marketing, and logistics. (Malmberg and Maskell, 2002; Schamp, 2005).

However, regional clustering can also have detrimental effects. Hassink and Shin (2005, pp. 572) stress that clusters can become "insular, inward-looking systems" and use lock-ins as an explanation for the decline of industrial areas. Intense inter-firm relationships can induce overconfidence, lock-ins, cognitive tunnelling (*e.g.*, "a common world-view that might confuse secular trends with cyclical downturns"), or political inertness by "thick institutional tissues aimed at preserving existing traditional structures" (see also Grabher, 1993). This may lead to the unwanted "process of un-learning … [which] … will often necessitate the disintegration and removal of formerly important institutions which now hinder further development." (Maskell and Malmberg, 1999, p. 179)

The regional clustering of industries is more than a group of companies located in a certain geographical area. It is more about the organisation of a mutual learning process for ongoing innovation among companies against a backdrop of existing horizontal or vertical competition. In this process, avoiding lock-ins or overcoming existent lock-ins is a prerequisite for industry survival. This definitely requires the systematic inclusion of various stakeholders and the careful management of the policy process.

1.2 How can Area Development Negotiations (ADN) be utilized as a transition management method for sustaining traditional industries?

Lundequist and Power (2002) argue that regional clusters may be formed as part of extensive policy processes advanced by public and private actors. In their review they distinguish four variants: i) industry-led initiatives, ii) top-down public policy exercises, iii) visionary projects from 'thin air', and d) small scale natural resource based clusters. We introduce a fifth variant: forming or supporting regional clustering by means of a transdisciplinary process, involving key stakeholders from industry, regional administration as well as scientists. In this approach, scientists and regional stakeholders collaboratively plan, assess and discuss how to realize cooperative business strategies in order to sustain and to promote the regional economy.

In recent times, a new discussion has developed around the concept of transition management (Rotmans *et al.*, 2001; Vollenbroeck, 2002). While it has been shown, on a descriptive or normative level, how complex human-environment systems develop over time and what role different stakeholders

take in this process (Wiek *et al.*, 2006), to our knowledge, no work has been done to describe and elaborate upon ways in which to develop and foster such processes to support regional clustering of industries. The central issues of how to build trust, how to mediate existing views and interests, and how to initiate a process of mutual learning need to be addressed. The ADN method was developed by Scholz *et al.* (1996, see also Scholz and Tietje, 2002) as a method for forming such transition processes. It has been applied in various fields, such as the promotion of future sustainable urban mobility (Loukopoulos and Scholz, 2004) or urban development (Scholz *et al.* 1996, 1997). ADN can be considered to be (i) an analytic mediation technique, (ii) a participatory method or (iii) a transdisciplinarity tool fulfilling, in our view, the requirements of a transition management method:

(1) The ADN method provides for consensus building among a group of stakeholders. Scientists participate primarily as knowledgeable process facilitators applying methods such as multi-attribute utility measurements.

(2) Participation has almost become a buzzword; however, what is actually meant is unspecified. Bickerstaff and Walker (2001) distinguish between consultation and participation, with the latter giving some level of power to external interests and the participating stakeholders. Van Asselt and Rijkens-Klomp (2002) classified participatory methods along two dimensions: (a) whether the process is a goal or a means and (b) whether the output of the process is to reach consensus or to map a spectrum of diverse views and alternatives.

(3) Transdisciplinarity denotes processes of mutual learning among science, industry and society (Scholz, 2000; Thompson-Klein *et al.* 2000) and is characterized by a process of joint problem definition, joint problem representation and joint problem solving.

The ADN procedure can be conceived of as a participatory method that considers participation both as a process and as a goal. It also seeks to reach consensus amongst stakeholders but only after having analytically mapped out existing options. As such, the ADN method stands in line with a long tradition of – sometimes overlapping – concepts like “advocacy planning” (Davidoff, 1965; Forester, 1994), “participatory planning” (Smith, 1973), “communicative planning” (Forester, 1989; Innes, 1998; Sager, 1994;

Willson, 2003), "collaborative planning" (Healey, 1998, 1999), and "deliberative planning" (Forester, 1999; Sager, 2002).

1.3 Can traditional industries persist in accessible rural areas in Central Europe?

As mentioned at the outset, issues of industrial location are not at the core of this chapter. Nevertheless, our empirical investigations provide some insight into the topographical prerequisites and success factors of traditional industries. We want to illuminate the current debate on industry location from the perspective of traditional industries, which have their roots in proto-industry (Phelps and Ozawa, 2003). This is in contrast to most studies, which begin mostly from a high-tech late-industrial or a post-industrial perspective (see *e.g.* Oakey and Cooper, 1989; Phelps *et al.*, 2001).

The location question has to be answered hierarchically on two levels: *(i)* whether Central Europe and *(ii)* whether a given geographical area in a country – in our case an accessible rural area – is appropriate. Clearly, the first question has to be answered individually for different industries, *e.g.* the textile manufacturing (excluding the clothing industry), sawmills and dairy industries, which were chosen as cases in this chapter. Differentiation is necessary with respect to two aspects. First, the scope of the production chain differs. Whereas the textile industry is a multi-level system ranging from spinning to textile finishing, sawmills and the dairy industry only cover the first transformation stage. Second, the competitors are to be found in different places. Whereas companies in the textile industry compete predominantly on a global market with Asian suppliers, the other two industries have primarily European competitors.

The second question, whether rural areas are appropriate for manufacturing, is of specific interest in this chapter. Historically, large cities have been thought to offer the best conditions for the operation of small firms. However, from 1960 to 1980 there has been a rapid decentralisation of manufacturing to areas with better access to cost-effective labour and areas with better terrain (Keeble and Tyler, 1995; Phelps, 2002). Some authors, such as Keeble and Tyler (1995), stress that entrepreneurs differ between urban and rural settings. Besides a high identification with the landscape and nature, some empirical evidence is given that "companies in accessible rural areas are undertaking a greater amount of enterprising behaviour

associated everywhere with business success" (Keeble and Tyler, 1995, p. 977). The implications are that relational, socio-psychological aspects are paramount as has already been stressed with regards to regional clustering (Cappello and Fagian, 2005; Torre and Gilly, 2000).

2 Method: Strategy formation and transition management by transdisciplinary Area Development Negotiations for traditional industries

This chapter investigates a regional process; specifically, which options key stakeholders in the Appenzell Ausserrhoden (AR) region would like to follow with respect to regional cooperation and business strategies. These system boundaries have been chosen because industrial policy in Switzerland is still decentralized and managed on a cantonal level (as is also the case in some other countries such as Austria; see Sturn, 2000). The canton of AR has experienced a rapid change in and decline of traditional industries. Our primary interest focused on sustainable economic development, in particular the maintenance of working places and the persistence of clusters of older industries in peripheral urban and rural locations.

2.1 The case of Appenzell Ausserrhoden

AR is a canton (i.e., a small state) of 20 communities with 53,500 inhabitants on 242 km^2 land that lies between 435 and 2,500 m above sea level. AR is located in the vicinity of the city of St. Gallen in the Greater Zurich Area (60 to 90 minutes travelling distance to downtown Zurich, see Figure 3). The percentage of outgoing commuters in AR decreases from 43% in the district close to St. Gallen to 32% in the more remote villages. During the 18^{th} century, production and sales of textiles dominated economic life (Witschi, 2002; Tanner 1982). At the same time 56% of the total land area of AR was agricultural, with the vast majority (98%) being utilized for dairy farming. Forests covered 29.6% of the land.

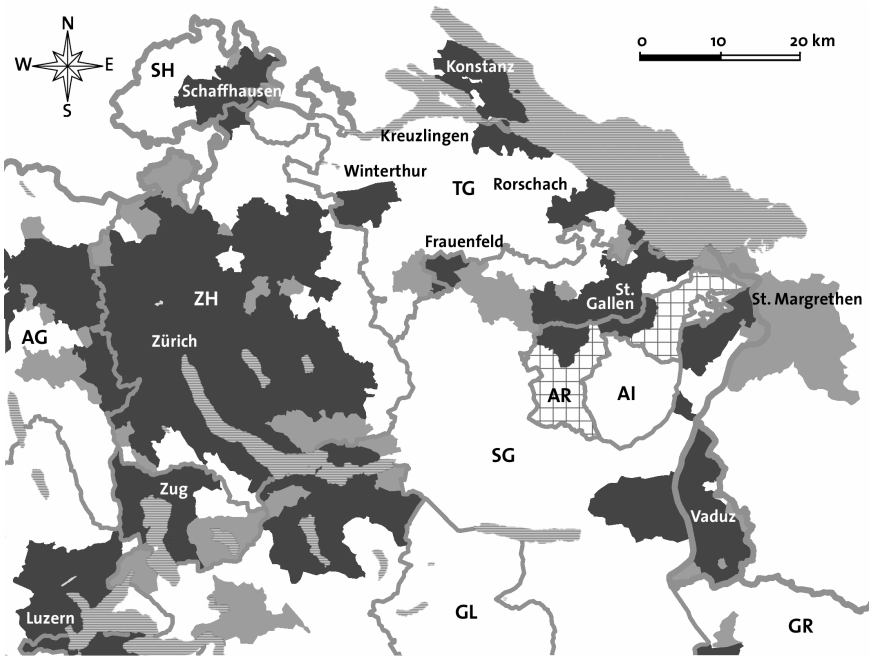

Figure 3. Location of Appenzell Ausserrhoden (AR) in the Agglomeration of St. Gallen and close to the Greater Zurich Area. Dark and light grey areas are agglomeration regions according to the definition used by the Swiss Federal Statistical Office; light grey areas became agglomeration areas between 1990 and 2000 (ARE, 2003).

The structural change process, along with the peculiarities of AR, is documented in Table 2. As can be seen, AR industrialised rather early and industries still play an important role (secondary sector in 1910 and 2001 above Swiss average). Yet, AR has been relatively slow in tertiary sector development (still much lower than in Switzerland) and has an above-average proportion of agriculture. The increase of the tertiary sector has stagnated in recent years, even decreasing in the more isolated areas (Eisenhut and Schönholzer, 2003).

Around 1880, AR was the most densely settled canton in Switzerland. From 1597 to 1794 the population even doubled from 19,000 to 39,000 inhabitants attaining the maximum of 57,973 in 1910 (Witschi, 2002). The population decreased to 44,500 in 1941 and slightly increased thereafter. After another decrease around 1980, a definite growth period again followed. This permanent struggle to maintain the number of inhabitants took place at a time of strong population growth in Switzerland. Whereas in 1850 1.8% of all Swiss lived in AR, only 0.7% did so in 2003. The

population decrease in AR after 1919 was a direct consequence of the loss of employment opportunities in the textile sector; for instance, about 6,000 jobs were lost between 1922 and 1929 (Witschi, 2002).

Table 2. Development of employment for different business sectors in Switzerland and the Canton AR in the years 1910, 1984 and 2001 (in %, BfS, 2003)

Business sector	*Canton of Appenzell Ausserrhoden*			*Switzerland*		
	1910	1984	2001	1910	1984	2001
primary	19	15	10	29	9	6
secondary	69	38	36	46	34	27
tertiary	12	48	54	27	57	68

2.2 Transdisciplinarity setting

The ETH-NSSI[3] case study was performed under the common leadership of the president of the canton of AR and one university professor.[4] A group of scientists from ETH-NSSI, various student groups, and the cantonal working group will herein be referred to as the case study team. Additionally, more than 100 stakeholders, among them CEOs from around 20 SMEs and a further 20 scientists from other universities or ETH departments participated in this study.

The case study team was organized into three working groups each including about 10 students. One working group examined the textile industry, another the dairy industry, and the third the sawmill industry. Each working group had a corresponding reference group comprised of about 12 members from the region and the industries. Together, they cooperatively

[3] ETH Zurich, Department of Environmental Sciences, Natural and Social Science Interface

[4] The study included an advanced university course, which combined teaching, learning and applied problem solving in a transdisciplinary setting (see Scholz *et al.*, 2006; Stauffacher *et al.*, 2006). On the science side, seven scientists based at ETH-NSSI and 36 students in the 9th term of the environmental science program made up the core team. The students only participated in the 14-week core phase of this 2-year project. Complementing the scientific group was a cantonal working group comprised of eight leading members of the public administration. In total, more than one hundred stakeholders participated in the study.

discussed targets, methods, people to involve, outcomes, conclusions and so on.

2.3 The choice of the three industries

Sawmills, the dairy industry and the textile industry belong to a business sector that grew in the age of agricultural manufacturing (Phelps and Ozawa, 2003) and that is under strong innovation constraints worldwide. All three so-called traditional industries are currently experiencing a rapid process of consolidation and transition due to ubiquitous globalised product and material flows. These industries exhibit both commonalities and differences. Whereas the textile and, to some extent, the sawmill industries compete on the world market, dairy products are predominantly traded on a regional or continental level. As we will see below, all these industries have played a decisive role in the history of AR and were therefore chosen for detailed analyses (see 'faceting' in Table 1). Furthermore, these three industries allow the inspection of different contexts with respect to horizontal and vertical competition and collaboration. Companies from the textile industry cover several vertical stages of the production chain. Sawmills and dairies only cover the first transformation stage between raw materials and industrial processing. Thus, we are dealing with horizontal competition.

2.4 Study design

The design is an "embedded case study" design (Yin, 1994), as elaborated within the context of sustainable regional transitions by ETH-NSSI (Scholz and Tietje, 2002; Scholz *et al.*, 2006; Stauffacher *et al.*, 2006). The key elements of this study are (i) defining a guiding question, (ii) faceting the case, (iii) system representation by impact variables, (iv) creating scenarios by means of Formative Scenario Analysis (FSA), (v) conducting a Multi-Attribute Utility Analysis (MAUT) by both referring to data- and science-based arguments (MAUT I) and by obtaining individual preferences from various stakeholder groups (MAUT II) and (vi) developing robust orientations for the transition process (see Table 3).

Table 3. Embedded case study design for the AR case study.

Step	*Description*
(1) Defining a guiding question (Scholz and Tietje, 2002, pp. 84-86, pp. 268-9)	The following question was jointly defined by the case study team: "What are the prerequisites for a regional economy that can sustainably operate in harmony with the environment and regional socio-economic needs."
(2) Faceting the case (Scholz and Tietje, 2002, p. 55-56)	We determined jointly with the stakeholders perspectives or subsystems that allow for sufficient representation and extrapolation: textile, sawmill, and dairy industries.
(3) System analysis (Scholz and Tietje, 2002, pp. 48-54, 87-88, 241-6)	We investigated history and dynamics of each industry using document analysis and analysis of relevant data from the national statistical office. We conducted structured interviews with the owners or CEOs of around 20 companies covering many topics including confidential economic (*e.g.*, annual turnover) and environmental data (*e.g.*, energy use)
(4) System representation (Scholz and Tietje, 2002, pp. 89-105)	We selected a set of impact factors considered sufficient to describe the current state of the system and its dynamics with respect to the guiding question within a 20-year time frame.
(5) Creating scenarios using Formative Scenario Analysis (FSA) (Scholz and Tietje, 2002, pp. 105-116)	We defined two to three levels of development for each impact factor. A scenario, then, is defined as a complete combination of levels of all impact factors. Using consistency analysis (Scholz and Tietje, 2002, pp. 105; Tietje, 2005) those scenarios exhibiting high inconsistency scores were discarded. The final selection of scenarios was done jointly with the stakeholders.
(6) Multi-Attribute Utility Theory (MAUT) (Scholz and Tietje, 2002, pp. 143-173, 197-224)	We used a small set of six to nine evaluation criteria in two different approaches of MAUT carried out by each of the three working groups: (i) calculations based on data, literature and/or expert interviews (data based evaluation MAUT I); (ii) for each industry, different stakeholder groups provided assessments (stakeholder based evaluation) in order to explore and to test differential and fallacious evaluations. Assessments were made in two steps: (MAUT IIa) intuitive (holistic) overall assessment of the scenarios and (MAUT IIb), which is still intuitive, but uses the criteria from the MAUT I.
(7) Developing robust orientations (Scholz and Tietje, 2002, pp. 268-269)	We discussed jointly with the stakeholders the results of the above steps in the reference groups and the case study team. Based on this transdisciplinary discourse, we developed orientations for the stakeholders.

3 Results

3.1 ADN for the textile industry

3.1.1 Procedure

The historical analysis was done in cooperation with the Swiss Textile Association. As there were no spinning companies in AR, two companies were included from neighbouring regions. Thus, a detailed regional value chain could be constructed. The confidential CEO interviews included questions on market position, turn-around, cash flow, management, technology expertise as well as on the expected market and technology change in the specific production segment. These data formed the foundation for the definition of impact variables, their levels and, consequently, the construction of scenarios. Eleven companies, two credit officers from banks and three representatives from the Swiss Textile Association participated in the ADN.

3.1.2 Results from the system analysis: Does a continuous decline come to an end?

In 2003, the European clothing and textile industry had an annual turnover of 215 billion Euro and a total workforce of 2.6 million; in Switzerland the turnover in 2002 was 1 billion Euro with 18,200 employees (Euratex, 2004; Credit Suisse, 2005). The Swiss textile industry was the fifth largest export industry in 2002.

The eastern part of Switzerland, in particularly AR, was historically the centre of the textile industry. In 1888 close to 50% of all labourers were employed in this industry; four times the Swiss average. This percentage even increased to a maximum of 53% in 1910 (CH: 10%), decreasing to 20% (CH: 3%) by 1950 (BfS, 2003). These developments were accompanied by a structural change of expertise and knowledge. Up to 1900 the leading edge in expertise and knowledge was in trade and business competency including best cotton purchases, adaptable production for changing markets, low operating costs, and low wages. Later, the competitive edge was technological expertise and knowledge including technology innovation, qualified labourers, and efficient production. This production efficiency was another factor contributing to the large decrease

in employees (*e.g.*, by 20% in the period 1985 to 2001), with turnover decreasing to a smaller extent (see Figure 4).

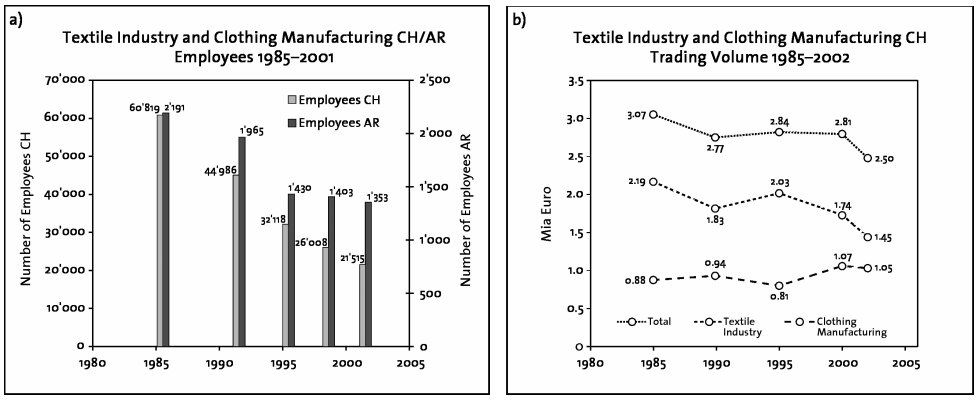

Figure 4. Employees (a) and trading volume (b) of the textile and clothing industries in Switzerland and Appenzell Ausserrhoden between 1985 and 2001 (Schöll et al., 2003).

By the year 2002, the AR textile industry had 1350 employees registered in 25 companies. This was 7% of all employees (CH: 0.6%). Some companies specialize in textile finishing, technical textiles or functional sportswear. On a horizontal layer, competition is strongest in the finishing domain, something which has generated a series of innovations including functional surfaces such as anti-electrosmog texture. Though the textile industry is characterized by international production chains, the management of the interviewed company has been concerned that the national production chain might become incomplete from a vertical point of view. The participating companies employ between 150-400 people. Some play a leading role in specific segments such as filter textures on a world scale.

3.1.3 Results from the scenario evaluations: Full-integration intuitively rejected but scored best in differentiated evaluation

We selected 22 participants for the evaluation from the following three groups: *Stakeholder Groups*: *Enterprises* (N = 8), *Regional Representatives* (N = 7) and a *Mixed Group* of national experts from banks, associations, local labour unions, and universities (N = 7).

The formatively created scenarios were based on 16 impact factors that have been considered essential for cooperation and technological and economic

development. We will sketch these scenarios here. An extended description of the FSA procedure is provided in Schöll *et al.* (2003).

Minimal Cooperation/Status Quo: All companies remain economically independent. This scenario describes the status quo. *Resource Sharing:* This scenario focuses on the joint utilization and management of resources. All required materials and energy are jointly acquired by a special joint sub-company, which allocates these resources to all in an efficient way. *AR Textile Network:* All enterprises maintain their autonomy and produce in their established segments. However, a special label *AR Textile Network* is introduced and all companies follow similar quality standards. Cooperation primarily takes place in marketing. *Full Integration:* All companies join to form a holding or even a single large company.

Table 4. Mean utility (rank in parentheses) of data based assessment (MAUT I); (holistic) intuitive evaluation (MAUT IIa) and criteria-based evaluation (MAUT IIb) by different stakeholder groups of the four future scenarios of the AR textile industry.

Assessment method and stakeholder group	*Minimal Cooperation*	*Resource sharing*	*AR Textile Network*	*Full Integration*
Data based MAUT I	.04 (4)	.56 (3)	.63 (2)	.77 (1)
Intuitive MAUT IIa				
CS-Team (N = 10)	.26 (4)	.74 (2)	.77 (1)	.56 (3)
Enterprises (N = 8)	.40 (4)	.68 (1)	.57 (2)	.51 (3)
Regional Representatives (N = 7)	.41 (3)	.73 (1)	.69 (2)	.18 (4)
Mixed Group (N = 7)	.24 (4)	.63 (1)	.62 (2)	.26 (3)
Criteria-based MAUT IIb				
Enterprises (N = 8)	.51 (4)	.59 (3)	.64 (2)	.70 (1)
Regional Representatives (N = 7)	.41 (4)	.64 (2)	.65 (1)	.57 (3)
Mixed Group (N = 8)	.48 (4)	.66 (1)	.64 (2)	.55 (3)

Table 4 presents the results of MAUT I (data based) and MAUT II (stakeholder based evaluation). On a descriptive level, the scenario *Minimal Cooperation* performs worst (7 out of the 8 evaluation scores receive a rank of 4) and the scenarios *AR Textile Network* (rank 1: twice; rank 2: 6 times) and *Resource Sharing* (rank 1: 4 times; rank 2: twice) perform best.

The *Full Integration* scenario generated a two-peaked preference distribution (rank 1: twice; rank 3: 5 times). This scenario received the best MAUT I rating and MAUT II rating by the *Enterprises* group whereas it ranked fourth in the intuitive evaluations provided by the *Regional Representatives* and the *Mixed Group*.

A repeated measurement analysis of variance (ANOVA) revealed a significant difference ($p < 0.001$) in the evaluation of scenarios. No significant effects could be detected for the *stakeholder group* variable. A comparison between the intuitive and MAUT II evaluations showed significant differences for the scenarios *Minimal Cooperation*, *Full Integration*, and *AR Textile Network*. Remarkably the scenario *Full Integration* scored worst in the intuitive evaluation but best in the multi-criteria assessment.

3.2 ADN for sawmill industry

3.2.1 Procedure

The historical analysis of the industry was conducted in cooperation with the cantonal forest authorities, every sawmill owner in the canton AR, and several regional and national experts. As with the textile companies, the regional value chain was reconstructed through interviews with the company owners. Detailed information about the market, technology and financial position was also collected.

3.2.2 Results from the system analysis: Companies that are too small and use outdated machinery

Historically, sawing has been a sub-activity of farming. Specialization only arrived in the 19th century due to new transport capacities, particularly rail, which were created between 1888 and World War I (Jüttemann, 1984).

At the end of the 20th century, Swiss forest and wood industry made up 1.9% of the national GEP and employed 80,000 people. In the year 2000, the export-import ratio of wood was 59:41 referring to volume and 40:60 with respect to value (export: 5.4 million tons with 3.3 billion Euro; import 3.8 million tons with 4.0 billion Euro). Wood of lower quality is exported while high-quality wood is imported (BfS and BUWAL, 2001, S. 106f). Small enterprises are under severe pressure. In the EU, 3,000 out of 43,000

wood processing companies receive direct subsidies, whereas none of the 400 Swiss sawmills do so (Jaakko Pöyry Consulting, 2002; Mosimann, 2002). In the last decade, each year approx. 5% of all Swiss sawmills were closed (Mosimann, 2002).

In 1836, there were 62 sawmills in the 20 AR communities located at creeks and rivers. This number decreased to 21 in 1991 and to only 10 small companies in 2002. These enterprises had only 2 to 7 employees (with a total of 60) and generated a turnover of between 160,000 and 1 million Euro per year. In 2002 about 18,000 m^3 wood was processed in AR. About 84% of this wood came from AR, 15.5% from other regions of Switzerland, the remainder from other countries. The average annual amount of wood processed per company varied from 200 m^3 to 10,000 m^3 (Wöhrnschimmel *et al.*, 2003). Each enterprise has at least one more transformation stage in its portfolio; for example, wood construction, transport, or wood trading. Technologically, AR companies are on par with a 1950 standard, using predominately log band saws and gangsaws. All companies are organized in the AR Wood Industry Association and they have recently founded the AR Wood Chain, in order to promote vertical cooperation.

3.2.3 Results from the scenario evaluations: More collaboration favoured but no full integration wanted

The 27 participants in the EP were assigned to four groups: *Sawmills* (N = 7), *Wood-processing* (without sawmills; N = 9), *Regional Authorities* (N = 5), *Foresters* (N = 6). The data based MAUT I evaluation was performed with the aid of seven national experts from forestry, wood industry, and electricity providers.

The standard procedure for creating consistent scenarios was applied with the following scenarios being chosen (a detailed description is provided in Wöhrnschimmel *et al.*, 2003):

Status Quo: No actions are carried out to meet the requirements of the current structural change in the wood industry. This implies that only 3 to 5 sawmills will survive. *Active Marketing*: All existing sawmills finance a special marketing unit. A special label for AR wood is created. The marketing of wood products is linked to tourist activities, in particular historical sawing machinery and products. *One Large Enterprise*: There is only one big sawmill in AR that has swamped the small mills. The capacity

of this industrial company, which acts nationally and internationally, is twice the amount of round wood processed in 2003. *Special Wood Products*: The number of companies is reduced. The AR sawmills focus on special and niche products, emphasizing exclusiveness and quality. *Wood Chain*: Three local centres manage sawmill logistics. All efforts are dedicated to increasing processing efficiency along the production chain.

Table 5. Mean utility (rank in parentheses) of data based assessment (MAUT I); (holistic) intuitive evaluation (MAUT IIa) and criteria-based evaluation (MAUT IIb) by different stakeholder groups of the five future scenarios of the AR sawmill industry.

Assessment method and stakeholder group	*Status quo*	*Active marketing*	*One large company*	*Special wood products*	*Wood chain*
Data based MAUT I	.37 (4)	.72 (3)	.32 (5)	.86 (1)	.85 (2)
Intuitive MAUT IIa					
CS-Team (N = 10)	.18 (5)	.58 (2)	.23 (4)	.56 (3)	.84 (1)
Sawmills (N = 9)	.39 (4)	.56 (3)	.24 (5)	.62 (2)	.65 (1)
Wood-processing (N = 7)	.25 (5)	.78 (2)	.26 (4)	.82 (1)	.73 (3)
Regional authorities (N = 5)	.20 (4)	.55 (2)	.18 (5)	.53 (3)	.72 (1)
Forestry (N = 6)	.33 (4)	.62 (3)	.23 (5)	.70 (2)	.81 (1)
Criteria-based MAUT IIb					
Sawmills (N = 9)	.47 (5)	.66 (1)	.48 (4)	.65 (2)	.65 (3)
Wood-processing (N = 7)	.37 (5)	.65 (2)	.39 (4)	.60 (3)	.66 (1)
Regional authorities (N = 5)	.38 (4)	.58 (3)	.33 (5)	.63 (2)	.68 (1)
Forestry (N = 5)	.46 (4)	.63 (3)	.44 (5)	.65 (2)	.68 (1)

The assessments presented in Table 5 clearly and consistently show that the scenarios *Status Quo Continued* and *One Large Enterprise* are rated to be less favourable when compared to each of the other scenarios (ANOVA: $p = 0.000$, $N = 26$). There are no significant differences between the scenarios with low scores and those high sores. This suggests that the most desirable future state, the one to which the stakeholder groups most aspire, is a mix of the scenarios *Active Marketing*, *Special Wood Products* and *Wood Chain*. This was also confirmed by workshop discussions following the EP. All stakeholder groups acknowledged the impossibility of continuing according to the *Status Quo*. The foundation of *One Large Enterprise* with about 36,000 m^3 processed wood was not welcomed by the stakeholder groups.

3.3 ADN for dairy industry

3.3.1 Procedure

The industry was jointly analyzed by members from the Chair of Agricultural Economics at the ETH, the cantonal agricultural authorities, and the case study team. The regional value chain was reconstructed using interviews with managers from five dairy farms and two business consultants in the field.

3.3.2 Results from the system analysis: Networking and merging for innovation and export in a saturated, subsidized market

In Switzerland, 38,000 farms processed 3.9 million tons of milk in the year 2000 (BfL, 2002). Approximately 45% of the processed milk was used for cheese production, while the remaining 55% was distributed as milk, butter, cream and other milk products. The Swiss milk industry received subsidies to the value of 450 million Euro (Koch and Rieder, 2002), which equates to 11,000 Euro per milk producer. The price of milk was 0.50 Euro/kg, 0.20 Euro/kg above the market price of neighbouring EU countries (2001). The market price of milk products in Switzerland is predicted to fall in the next years due to the abolishment of price guarantees and due to milk quotas that are substituted by tolls (Koch and Rieder, 2002).

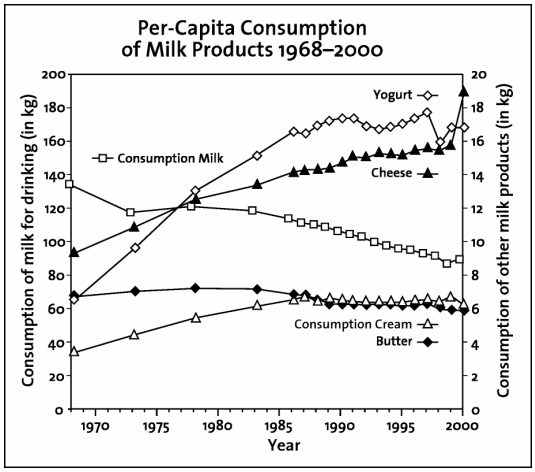

Figure 5. Long-term market development for milk products in Switzerland (Treuhandstelle Milch, 2000).

The dairy market is highly saturated (Figure 5). Between 1980 and 2000, the per capita consumption of milk products decreased by 26% (BfL, 2002).

The production of cheese increased by 17.5% from 1992 to 2003, whereas the per capita consumption increased by only 14.5%. During the same period, milk powder production increased by 13.8% with an export quota of 49.8%. The largest market shift was with yoghurt, which increased by 130%.

There were 600 dairy farms in AR producing 45 million kg milk p.a. About 42% of this total is processed in the AR canton, with 75% going to cheese production. The Appenzeller® cheese label is a regional label and covers 86 dairies located in eastern Switzerland (Weber-Eggenberger and Krütli, 2003). However, only nine dairies in AR processed Appenzeller® cheese. They account for 12% of the total cheese production in AR and use 28% of the AR milk. The largest AR dairy produces 8.5 Million kg cheese. The regional value added of the agricultural sector amounts to 23 million Euro p.a. composed of about 73% milk production, 16% dairy production, and 11% milk processing and cheese trading. This added value is, however, offset by 20 million Euro of various types of subsidies (Weber-Eggenberger and Krütli, 2003).

3.3.3 Results from the scenario evaluations: intensive forms of cooperation preferred but not across administrative borders

Three stakeholder groups were invited: *Dairy managers* (N = 8), *Dairy traders* (N = 7), and *Regional Authorities* (N = 7). Four scenarios were constructed and presented for the evaluation:

Status quo: This scenario portrayed the given situation. *Cooperative*: An economic unit resembling a cooperative is the key idea of this scenario. The core activity of the *Cooperative* scenario is the marketing of regional products, targeting the recognition and image of all Appenzell milk products. *Centralization within AR*: Centralization of production is established in the canton AR. A maximum of three production sites will continue. *Centralization outside AR*: Milk is processed centrally but outside the borders of the canton. There are no dairies in the AR canton. In AR, the generation of the added value is restricted to milk production.

Table 6. Mean utility (rank in parentheses) of data based assessment (MAUT I); (holistic) intuitive evaluation (MAUT IIa) and criteria-based evaluation (MAUT IIb) by different stakeholder groups of the four future scenarios of the AR dairy industry.

Assessment method and stakeholder group	*Status quo*	*Cooperative*	*Centralization within AR*	*Centralization outside AR*
Data based MAUT I	.61 (3)	.81 (1)	.70 (2)	.06 (4)
Intuitive MAUT IIa				
CS-Team (N = 10)	.32 (3)	1.0 (1)	.87 (2)	.26 (4)
Dairy managers (N = 8)	.37 (3)	.77 (1)	.71 (2)	.19 (4)
Dairy traders (N = 7)	.30 (3)	.83 (1)	.74 (2)	.19 (4)
Regional authorities (N = 7)	.32 (3)	.73 (2)	.76 (1)	.26 (4)
Criteria-based MAUT IIb				
Dairy managers (N = 8)	.44 (3)	.65 (1)	.62 (2)	.26 (4)
Dairy traders (N = 7)	.43 (3)	72 (1)	.67 (2)	.29 (4)
Regional authorities (N = 8)	.42 (3)	.62 (2)	.66 (1)	.33 (4)

The assessment of the scenarios (Table 6) shows that *Centralization outside AR* is least favoured. The scenario *Status Quo* is consistently the next-least preferred alternative, though this scenario receives positive evaluations with respect to the social criteria (results not shown). In contrast, the scenario *Centralization outside AR* received negative judgments on this attribute but positive judgments on economic attributes. The differences between the evaluations of scenarios are statistically significant (ANOVA, $p < .001$). Pair wise post-hoc tests show that the scenarios *Centralization within AR* and *Cooperative* are significantly better rated than the other scenarios. There are no significant differences between the judgements of the stakeholder groups.

4 Discussion and conclusions

The following section is structured according our two main questions. (1) What are the perceptions of different stakeholders of regional clustering in the traditional textile, sawmill and dairy industries? What are the commonalities and differences in the perception of stakeholders between the three industries and how do these relate to their context of horizontal and

vertical competition? Furthermore, we will demonstrate why we believe that the accessible rural areas, and particularly AR, are a suitable location for traditional industries. (2) What role can transdisciplinary discourses with *ADN* play in strategy formation and transition management so as to sustain traditional industries?

4.1 Cooperation for sustaining traditional industries in AR

4.1.1 AR textile industry: Strong clustering evaluated best but disliked – the socio-psychological level of clustering

The current size of most companies has been definitely too small to successfully compete on the global market. There is a need for enhanced cooperation in marketing, product development and innovation, resources and energy use, education, and environmental labelling and certification.

The findings suggest that key stakeholders in AR consider cooperation between enterprises as positive and beneficial. All presented forms of cooperative action outperformed the status quo in all types of evaluation. Thus, intensifying cooperation on a regional scale is considered as beneficial. The stakeholder-based evaluation further indicates that collaboration should go beyond the sharing of resources and not be limited to energy, wastewater, or transportation logistics.

The scenario *Full Integration* is intuitively disliked. This most probably is rooted in emotional resistance; merging a group of 150-year-old companies, which operate in different stages of the textile production chain, seems to cause spontaneous unease. This fact points to the importance of the relational, i.e. socio-psychological level of regional clustering (Cappello and Fagian, 2005; Torre and Gilly, 2000). This negative judgement is reversed in the criteria based MAUT IIb evaluation; the vision of a large-scale merger among the companies of AR is most preferred.

4.1.2 AR sawmill industry: all forms of collaboration wanted, full integration feared – cluster idea pursued

The analysis indicates that the dilemma of the sawmill industry can only be solved through an integrated strategy for the regional forest and wood industries in which sawmills (i.e., the first transformation stage) play a pivotal role.

Product innovation seems to be necessary for niche products such as moon wood (i.e. wood that is cut at the time of the new moon) or energy-efficient pellets produced from wood chips. Given this background, a realistic perspective is that one bigger sawmill covers the mass flows while small mills take care of niche products.

The foundation of *One Large Enterprise* with about 36,000 m^3 processed wood was not welcomed by the stakeholder groups. Based on the experts' judgements, a business plan for such a scenario would only work under favourable market constraints and a high demand of wood products; they considered one large sawmill with a minimum capacity of 150,000 m^3 to be profitable. The local stakeholders seem to fear such a development but favour instead intensive forms of cooperation among independent companies, i.e. the core idea of regional clustering (Porter, 1990).

4.1.3 AR dairy industry: strong collaboration desired but only locally – a lock-in?

The dairy industry is undergoing a consolidation process. Small enterprises have the option of either finding appropriate niches, joining a cooperative, or closing down. Price pressure will result in a further reduction of the number of farms and dairy production sites.

The different stakeholder groups did not welcome the idea of relocating dairies from AR to other regions and thus achieving scale effects. The maintenance of regional production and added value chains seems to be desirable. It seems plausible that this is the result of a specific lock-in (Hassink and Shin, 2005; Grabher, 1993; Maskell and Malmberg, 1999). Whether this local view can be maintained seems questionable.

Concerted action is needed with respect to the marketing of regional products. These can be efficiently produced at medium-sized sites as they are able to be produced in a cooperative. Due to the canton's small size and hilly topography, a large dairy as is typically the case in France or the Netherlands seems highly unlikely. However, the neighbouring prealpine regions of Austria have increased their export quota and have overtaken Switzerland in recent years most probably due to the strong cooperation efforts made in this region (Rüdisser *et al.*, 2005).

4.1.4 Commonalities and differences between industries – the interplay of collaboration and competition in horizontal and vertical clusters

Future scenarios in which collaboration, networking, resource sharing or cooperative building were presented, were generally considered more attractive than the status quo, i.e. scenarios fostering regional clustering were clearly preferred. There was, however, an important difference in the evaluations, which can shed some light on the preference of regional clustering in different industries: The textile managers' analytic, multi-criteria evaluation rated the full-integration scenario better than scenarios in which networking is practiced in a sectoral and less integrated manner. The opposite was the case with the sawmill and dairy industries. This is not that surprising if one refers to the differentiation between cooperation and learning dynamics in horizontal and vertical clusters. The clustering of the textile industry covered the vertical stages of the production chain. According to Malmberg and Maskell (2002), vertical cooperation is promoted if the capabilities are similar, trust is established and the production is specialized. Trust among companies has obviously been missing and has prevented more intense forms of collaboration in the previous decades. This has presumably been caused by a 150-year history of hostile rivalry and local competition among Swiss textile companies. Today, however, this competition is to some extent more antagonistic. This reflects the dark side of clustering: the "inability to unlearn" (Malmberg and Maskell, 2002, p. 441).

The clustering of sawmills and dairies was investigated with respect to the first transformation stage between raw materials and industrial processing. Thus, we were dealing with horizontal clustering. According to Malmberg and Maskell (2002) clustering dynamics are enforced by similarity, cognitive proximity and variation. Mutual comparison, coordination and collaboration should also promote clustering and mutual learning. Networking, when utilizing Appenzell as marketing and quality label, as well as common products, can be understood as potential for collaboration.

In general, the above discussion provides insights into the difficult balance between "competition and cooperation in industrial clusters" (Newlands, 2003).

The rejection of scenarios that would involve the relocation to other regions as well as many statements about the persistence of these industries in AR,

point to regional identity and common values in the context of regional clustering. This exemplifies the importance of the relational and organizational character of clustering (Boschma, 2005a, 2005b; Capello and Faggian, 2005; Gilly and Torre, 1999; Torre and Gilly, 2000): geographical proximity is important but not enough. In this respect, the AR region certainly has an important asset in that its regional identity still seems to be vivid and rooted in day-to-day actions (Scholz and Stauffacher, 2002; 2003). Given some visible general caution against cross-border collaboration, it seems crucial to strengthen links to external firms, something present within the textile industry but lacking in sawmills and dairy industries. Failure to do so will certainly endanger the continued existence of these industries through cognitive lock-ins (Grabher, 1993; Hassink and Shin, 2005; Maskell and Malmberg, 1999).

4.2 Are traditional industries well placed at the peripheries of agglomerations?

With respect to the location question we can provide some negative and a large number of positive considerations for the AR region. A critical negative point is the prealpine topography with narrow valleys and steep hills, which provides only few areas for factory floors or storage space. Logistics for sawmills are also hampered, as there is only a narrow-gauge railway. The most critical question for the persistence of manufacturing in Switzerland is — for many industries similar to the textile industry — whether the handicaps of high Swiss wages and high environmental standards can be compensated for by product quality, technological know-how and innovation, specialization, appropriate company size, and professional marketing. The AR textile industry, for instance, is under severe global market pressure (Scholz and Kaufmann, 2003). With respect to relocation to countries with lower wages, such as those in Eastern Europe or Asia, the general view is that the companies need to be strong and at the peak of the production pyramid. In other words, research and development (and their institutional underpinnings) as well as high-tech and leading edge production should remain in Switzerland, with other sites serving for mass production. Thus, those enterprises that had considered relocation chose a two-fold strategy: The high-end, high-tech production (including technology development and business administration) remained in Switzerland whereas

mass production was transferred to low-wage countries. The strategy of the AR firms differs from those of the German Pirmasens area[5], which "either stayed in the industry, but left the region; or stayed in the region, but left the industry" (Schamp, 2005, p. 617). This might be due to the fact that shoe industry does not (yet) have an elaborated high-end, high-tech branch.

Advantages mentioned by almost all firms for locations in accessible rural areas were, besides the relatively low costs, the simple and direct relation to state agencies (which is certainly facilitated by the small size of the AR canton) and the access to labour forces, which show more loyalty and higher flexibility with respect to work schedules. Additionally, the identification of entrepreneurs with their region turned out to be important. All interviewed entrepreneurs showed an extraordinarily strong commitment to AR and unequivocally conveyed that they intended to continue production in AR. This regional commitment was enhanced as many firm managers came from families that had owned the company for more than one hundred years.

When considering the dairy and sawmill industries in AR, we first point out the close physical links as most of their natural resources come from these areas. This is not the case for textile industry (apart from energy and water[6] taken from local creeks). Schmithüsen *et al.* (2003) reported another case supporting the possibility of sawmill industry survival in the rural areas of Central Europe, including the Alpine region. The Austrian sawmill industry in the state of Vorarlberg, which is just a few kilometres from AR, is far more efficient and processes 10 to 25 times more wood than the AR mills. However, the Vorarlberg sawmills are also embedded in an innovative and flourishing wood chain. Hence, a regional sawmill for the AR canton is only realistic if specialization and embedding in later stages of the production chain is ensured, and if technology, quality or niche arguments are made in an appropriate manner.

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[5] This statement must, however, be interpreted against a background of ongoing decline in the number of working places in the AR textile industry, as is also the case for the Pirmasens shoe industry.

[6] Historical rights for water utilization and waterpower plants play a decisive role for some companies with extensive consumption of natural resources such as textile finishing.

Raw milk can only be transported for a couple of hundred kilometres. In cheese production, however, the national and international levels are much more important. Given current logistics and low transportation costs, exports have become increasingly important domain for dairy industry. Cheese production even shows some features of wine production with regionally processed, high quality products having a fair chance in the international market. Again, the neighbouring Austrian Vorarlberg region could serve as a model for AR, as the Austrian dairy industry has tripled its export quota since 1996 to 75,000 tons per year and has overtaken annual Swiss cheese exports of 50,000 tons (Wyss-Aerni, 2004).

Finally, the location question should be considered from the perspective of the peripheral regions. As service industries have become the domain of cities (Ravetz, 2000), agriculture and dairy farming, the forest and wood industry, and, in the case of an attractive landscape, tourism, are the main options for regions at the fringes of urbanized areas. In the case of AR, synergies can clearly be established between regionally located dairies and sawmills (which both support the conservation of the cultural landscape) and tourism. If there is an interest in preventing depopulation or an extension of urban sprawl into more distant areas, then those areas are still a valuable place for traditional industries. In this context, an interesting political lock-in (Hassink and Shin, 2005) was observed: at the beginning of the project the cantonal administration was keen on 'modern' industries, such as information technology (IT) and bio-technology, with the value of their traditional industries becoming apparent only after having participated in the ADN. Summing up, we can conclude that in the Swiss context the choice for manufacturing in the accessible rural area of AR is better than in other locations close to cities or in more distant peripheral areas.

4.3 Developing and fostering regional clustering by ADN

In addition to the multitude of existing advocacy, communicative, participatory, collaborative, or deliberative planning methods (Davidoff, 1965; Forester, 1989, 1994, 1999; Healey, 1998, 1999; Innes, 1998; Sager, 1994, 2002; Smith, 1973; Willson, 2003) ADN offers a thoroughly tested research based methodology (see Scholz *et al.*, 2006) and a concrete stepwise procedure (see Table 1). In our experience, the following elements were most decisive: common construction of reality by jointly defining the guiding question and faceting the case (Stauffacher *et al.*, 2006), the

formative construction of a set of different options, i.e. scenarios (Wiek al., 2006); and assessment using different methods and contrasting multiple perspectives (Scholz *et al.*, 2006). In contrast to the often centralized and administrative concept of state-governed planning activities, the ADN method was led by an independent research agency based at the ETH Zurich. On this basis, the problem of cognitive lock-ins (Grabher, 1993; Hassink and Shin, 2005, Maskell and Malmberg, 1999) can be detected and most likely minimized due to the formal establishment of external links. The ADN method in fact served as an important catalyst to institution building by offering a "community of practice" (Lave and Wenger, 1990; Wenger, 1998), an important aspect for regional clustering as highlighted by Bathelt (2005).

We cannot answer if regional clustering is a valuable strategy for industry survival; however, we investigated how transitions can be approached in clusters using the ADN method and focussed specifically on the process itself. The main argument put forward here is that clustering is desired by local stakeholders – an important starting point and prerequisite for any successful clustering project.

More than 30 enterprises participated in a mediated discourse on finding options and orientations. The AR cantonal authorities and a group of university members jointly initiated the process as a discourse in mutual learning (Scholz, 2000). Almost all the enterprise representatives we contacted participated in our study. The ADN process extended over about two years. Whether consensus building and joint problem solving took place has not been rigorously assessed. Thus, we are forced to refer to data and events gathered in an unsystematic manner.

> The Swiss *Textile* association launched a national study to extrapolate our system analysis to the whole of Switzerland (Scholz and Kaufmann, 2003). The association also initiated a series of national and international meetings in order to discuss the networking and merging/holding vision both for the industry as a whole and for single production-chain links.
>
> The AR *dairy industry* applied the method again as a decision support system in current discussions dealing with the future of a milk collection point in one of the villages in AR. The ADN

procedure was again very well received by more than 50 dairy farmers and proved to be an excellent tool for analytic mediation.

Finally, in the AR *sawmill industry* the results of the study were intensely discussed. According to feedback from various participants, the 'AR Wood Chain' received important, new inputs in the form of case study results. Improved marketing of niche products and regular 'days of woodworking' as promotional events are currently being discussed.

Clearly, these accounts cannot replace a controlled, systematic evaluation design. However, the stories provide a consistent pattern, which go in hand with other positive accounts from the more than 10 transdisciplinary studies we have thus far conducted. Hence, the transdisciplinary process using the ADN method had some lasting impacts and induced various cooperative actions. The ADN discourse was well accepted by all stakeholders. This might be different in other countries with different cultures of competition and cooperation. "For example, in the US and the UK, with more flexible labor markets and 'orthodox' competitive norms, collaborative arrangements between firms may be less likely to develop." (Newlands, 2003, p. 530)

In conclusion, the present study is a demonstration of a transdisciplinary, research-based planning approach. Sustainable development necessitates the use of such new forms of planning to organize and manage the ongoing inquiry into efficient resource use in order to keep systems within their functional limits and to respect the needs of future generations (Laws *et al.*, 2004).

IV Case study 2: Transdisciplinary case study as a tool for collaborative planning of sustainable tourism development in the Seychelles[7]

1 Introduction

Environmental relevance of tourism is well documented (see *e.g.* Butler, 1991; Gössling, 1999; Gössling *et al.*, 2002; 2005; Neto, 2003; Shah *et al.*, 2002; Welford *et al.*, 1999) but at the same time, tourism industry plays an outstanding economical role with "almost US$622 billion of receipts" and a 25 per cent grow in the past 10 years (UNEP and WTO, 2005, p. 8). It is therefore not surprising that tourism – respecting its potential detrimental role to the environment and therefore normally referred to as 'sustainable tourism' – is promoted by a broad range of different institutions like in development cooperation, agencies fighting poverty, tourist officials, conservationists and international organisations ranging from the World Wild Fund for Nature to the World Bank (see *e.g.* Ashley *et al.*, 2001; Neto, 2003; UNEP and WTO, 2005).

We document in the following literature in sustainable tourism development (STD) stressing that we perceive STD as prototypical example for collaborative planning in sustainable development. Such planning processes necessitate analytic and systematic methods; an issue we turn to in some detail hereafter discussing the method of stakeholder based multicriteria analysis. We are then presenting our own research work: the application of our Area Development Negotiation (ADN) method within a transdisciplinary case study design (Scholz and Tietje, 2002; Loukopoulos and Scholz, 2004; Scholz and Stauffacher, 2006) for a STD project in the Seychelles islands. We conclude with a discussion on future tourism development in the Seychelles and on analytic and systematic methods for collaborative planning.

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[7] This chapter is based on a paper written in collaboration with Saskia Günther, Pius Krütli, Christoph Küffer, Frauke Fleischer-Dogley, Roland W. Scholz

2 STD as a prototypical example for collaborative planning processes

Considering the long discussion in the field, we favour a broad understanding of STD addressing all forms of tourism; taking into account environmental, socio-cultural as well as economic aspects; with a continuous process understanding and involving concerned stakeholders from different business sectors and administrative departments.

2.1 From a niche product to sustainable forms of mass tourism

Based on a critical literature review, Clarke (1997) presents different chronologically sequenced positions in sustainable tourism. A first position from the 1980s, he named as "polar opposites" (*ibid.*, p. 225), referring to sustainable tourism as an alternative for mass tourism in strong opposition to prevailing forms of tourism.[8] Later in the 1990s, Clarke saw the emergence of an understanding as "a continuum between sustainable tourism and mass tourism" (*ibid.*, p. 226). Yet, according to Clarke both positions were criticised for their simplistic and restricted perspective view and a third position was developed focussing on changing mass tourism towards more sustainable forms (see *e.g.* Neto, 2003; Simpson, 2001; Wall, 1997; Welford *et al.*, 1999). Likewise, sustainable tourism was seen as an ongoing process not a state any longer. As a result, it became evident that STD should be more than a niche product but that all forms of tourism should be addressed. This is reflected in a recently published definition of the World Tourism Organization (WTO, 2004b, our emphasis): "Sustainable tourism development guidelines and management practices are *applicable to all forms of tourism* in all types of destinations, including mass tourism and the various niche tourism segments."

[8] The discussion of the environment and tourism nexus is in fact even older: *e.g.* Budowski (1976) introduced already three different relationships: conflict, coexistence and symbiosis; and the concepts of "sanfter Tourismus", "alternativer Tourismus" have been widespread already in the 1970s at least in German speaking countries (Strasdas, 2001, pp 87-90).

2.2 STD is more than economically sustaining tourism or environmental friendly tourism

In one of most cited research papers on STD, Butler (1991) not even tried giving a definition of STD, but just referred to the report 'Our Common Future', a view for long time followed by the WTO, as well (see *ibid.*, p. 10). Implicitly Butler (1991) had a clear environmental view on STD, as he went on discussing various strategies to reduce the impact of tourism on the environment. In his later works, Butler (1999), reviewing different existing definitions, found two distinct understandings of STD: one where "the emphasis is on the maintenance of tourism" (1999, p. 11) – basically an economic understanding – and a second where "tourism is developed in line with the principles of sustainable development" (*ibid.*, p. 12). This distinction has been taken up by various authors (*e.g.* Wall, 1997; Sharpley, 2000; Farrell and Twining-Ward, 2004) with a view to confine STD to the second more broad understanding – a by now commonly accepted view as can again be illustrated by the latest WTO definition (2004b, our emphasis): "Sustainability principles refer to the *environmental, economic and socio-cultural aspects of tourism* development, and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability."

2.3 STD integrated in larger context of socio-economic development – context matters

Hunter (1997, pp. 860-862) discussed four different models of STD: "tourism imperative" ("tourism could provide the means for some degree of environmental […] protection"); "product-led tourism" ("avoiding tourism-related damage to nearby pristine locations"); "environmental-led tourism" ("prioritizing environmental concerns over marketing opportunities"); "neotenous tourism" ("tourism activities would be limited to the very early, juvenile, stages of tourism development"). According to Hunter each of them is suited for different contexts. Tourism imperative is justified in a poor economical situation; product-led tourism seems most suited for old tourism areas dominating local economy; environmental-led tourism on the other hand is for areas where at present little tourism is present; and neotenous tourism for areas without any tourism activity. With his model, Hunter offers a dynamic approach sensitive to the context. This idea has later been taken up and developed further by Farrell and Twining-Ward (2004), who called for an adaptive management in STD as ongoing process.

Here again, the dynamic character is stressed and the idea of just one valid concept of STD – as panacea – for the whole world refuted.

2.4 Community involvement as key success factor for STD

Simpson (2001, p. 11) saw STD as a fifth planning approach in tourism after the "boosterism approach" (beneficial activity that should be maximised); the "economic approach" (valuable force for economic development), the "physical/spatial approach" (negative environmental impacts to be minimised); and the "community approach" (development through local control). According to Simpson, STD rejects the first and integrates elements of the latter three giving community aspects a distinctive place. This is in line with results from evaluation studies which name 'local community involvement' and 'co-operation of different partners' as among the major success factors for sustainable tourism projects (WTO, 2000).Recently, the field of STD abounds with papers on participatory approaches (*e.g.* Aas *et al.*, 2005; Arajo and Bramwell, 2002; Bramwell and Sharman, 1999; Fadeeva, 2004; Jamal and Getz, 1995; Jamal *et al.*, 2002; Kernel, 2005; Simpson, 2001; Timothy, 1999a, 1999b; Tosun, 2000, 2005) and the WTO definition stresses (2004b, our emphasis) that STD requires "informed *participation of all relevant stakeholders*".

2.5 STD as complex decision problem and ongoing inquiry process

Sustainable development necessitates the use of new forms of planning to organize and manage the ongoing inquiry into efficient resource use in order to keep systems within their functional limits and to respect the needs of future generations (Laws *et al.*, 2004). Such an understanding became lately visible in the WTO definition (2004b, out emphasis): STD requires a "*continuous process and it requires constant monitoring* of impacts". Yet, if "environmental, economic and socio-cultural aspects of tourism" (WTO, 2004b) are relevant in STD, conflicting goals are evident and disaccords between stakeholders will surface and need to be addressed adequately – not only by improving the process but even more by tackling the complexity of the analytic decision problem at hand. Otherwise in such complex decision making situation without a sound methodology distorted results are to be expected (Lahdelma *et al.*, 2000). This very fact is hardly reflected in present literature on STD.

2.6 Tourism industry with multi-sectoral character

STD concerns different organizations, institutions, and companies. Jamal and Getz (1995) stress that tourism planning has to be integrated with planning for social and economic development and that no business sector or administration department can function independently in tourism development. Timothy (1999b) identified four different forms of cooperation in the context of STD: public-private partnerships, collaboration among government agencies, among different levels of administration (*e.g.* between state and municipalities) or across territorial political boundaries (*e.g.* between different municipalities or international collaboration in cross-border regions). This multi-sectoral character of STD is stressed by many authors (*e.g.* Harrill, 2004; Hunter, 1997; Fadeeva, 2004), yet mostly focussing the public and economic sector only. Beesley (2005) – referring to the triple helix approach in innovation (see Leydesdorff and Etzkowitz, 1996) – stressed the complementary important role that university and research institutions should play in STD projects. Largely neglected is the fact that tourism industry normally covers on one hand different levels of the supply chain and on the other hand various firms offering similar products. That means tourism is a prototypical case where both vertical and horizontal cooperation but as well as competition (Malmberg and Maskell, 2002) play a decisive role and thus for collaborative planning processes on regional level (Scholz and Stauffacher, 2006).

3 Analytic and systematic methods to collaborative STD

In the literature on STD, there is a general lack of consideration how and by what means the input from different stakeholders can best be framed to allow for optimal knowledge integration and thereby improved decision making. Given the complexity of the decision problem having a set of different options for future development, with a prerequisite to include knowledge and values from different stakeholders but as well gauging diverging goals and scrutinizing trade-offs, analytic and systematic approaches to STD appear obligatory.

3.1 Stakeholder based 'multi-criteria analysis' as an example for an analytic and systematic method

Systematic and analytic methods to collaborative planning in sustainable development have only recently gained a more prominent role (see *e.g.* Ananda and Herath, 2003; 2005; Brown *et al.*, 2004; Loukopoulos and Scholz, 2004; McDaniels and Trousdale, 2005; Mendoza and Prabhu, 2005; Pavlikakis and Tsihrintzis, 2003; Reichert *et al.*, 2005; Scholz and Stauffacher, 2006; Sheppard, 2005; Sheppard and Meitner, 2005) though similar approaches have been proposed and implemented already in the 1990s (*e.g.* Belton and Pictet, 1997; Gregory and Keeney, 1994; Joubert *et al.*, 1997; for recent review see Balasubramaniam and Voulvoulis, 2005). Most of them apply a generalized model of a decision making process (see *e.g.* Keeney and Raiffa, 1976). Sheppard and Meitner (p. 184) stress that this can "help [to] bridge the gap between general participatory processes and complex decision-support systems."

Brown and colleagues (2001) applied a 'multi-criteria analysis' (MCA) of scenarios for marine protected areas. Stakeholder based MCA was "used as a tool to facilitate the deliberations of stakeholders" (*ibid.*, p. 419) of different management alternatives. The scenarios were "based on existing development plans and knowledge of challenges" (*ibid.*, p. 420), assessed by interviewing planners and government stakeholders. Scenarios were described using estimated developments in three key drivers. Stakeholders were involved in the process of criteria development (*ibid.*, p. 420), but the actual evaluation was done by a data driven expert approach. Additionally, stakeholders provided criteria weights, which were used to do sensitivity analysis of the MCA (*ibid.*, pp. 428-9).

Sheppard and Meitner constructed two scenarios "using spatio-temporal (input) modelling of ecological and operation conditions" (2005, p. 175) with no stakeholder input. Scenarios were visualized using a geographical information system (GIS). Identification of evaluation criteria was done in consultation with different stakeholder groups who as well weighted criteria. In parallel to the expert evaluation, stakeholders "were asked to give their direct overall preferences for the two scenarios" (*ibid.*, p. 178). In the studies of Sheppard and Meitner (2005; see as well Sheppard, 2005) systematic comparisons of expert and stakeholder based evaluations were conducted and allowed the "comparison of results between expert-only evaluations of scenarios, various stakeholder weightings applied to expert

evaluations […], and direct stakeholder preferences for scenarios" (*ibid.*, p. 175).

In the model described by Reichert *et al.* (2005) the criteria set was developed by the research team though stakeholders had the possibility to name their own criteria but did not request additional ones. As well a preliminary list of alternatives was set up by the researchers. Stakeholders did not evaluate alternatives but provided detailed preference information on outcomes of the different alternatives predicted by experts. As such it was possible to "apply the elicitation results to alternatives developed during the subsequent analysis" (p. 11). This is iterative approach was one of researchers most prominently stressed features of their method.

Ananda and Herath (2003; 2005) applied as well a stakeholder based MCA but primarily focussed the difference between overall 'holistic' evaluation of different options and a multi-criteria approach both elicited from stakeholders only. Criteria "were chosen after several discussions with stakeholders" (*ibid.*, 2005, p. 412) and options constructed by experts changing levels of three key variables.

3.2 Our own approach: transdisciplinary case study using Area Development Negotiations (ADN)

The first and last author together with colleagues from the ETH developed in the 1990s a comparable method, called Area Development Negotiations (ADN) within the framework of an embedded case study design (Scholz *et al.*, 1995; Scholz and Tietje, 2002). We are systematically integrating knowledge and values from research and society and therefore denote our design as 'transdisciplinary case study'. The term transdisciplinary refers to a new form of knowledge production whereby a mutual learning process between science, industry and administration is aspired (Scholz *et al.*, 2000). One core element is the so called ADN method (Scholz *et al.*, 1996; Scholz and Tietje, 2002; Loukopoulos and Scholz, 2004; Scholz and Stauffacher, 2006). It can be conceived of as a collaborative planning method. Our use of the term "collaborative" is deliberate though many other are used in the field (*e.g.* participative, community-based, and communicative). Thereby we would like to stress the importance of "a true partnership" in a joint and mutual learning process – with reference to the

seminal idea of a "ladder of citizen participation" introduced by Sherry Arnstein (1969).

As other stakeholder based MCA, the ADN approach goes over and beyond most collaborative approaches that focus mainly the participatory process (*e.g.* Forester, 1989; Healey, 1998; Innes, 1998; Sager, 1994) but giving no guidance how to tackle analytically the substantive decision problem at hand, i.e. without explicitly and transparently incorporating stakeholder preferences in the decision making process (for a similar reasoning see Gregory *et al.*, 2005). As such it is decision aid method, giving stakeholders the possibility to learn more about the decision problem in a structured and transparent way (Belton and Pictet, 1997; Gregory *et al.*, 2005; Joubert *et al.*, 1997; Lahdelma *et al.*, 2000; McDaniels and Gregory, 2004). Following a model of a strategic decision process (see Mintzberg *et al.*, 1976), our general framework covers the following steps: analysis of the present situation identifying and describing the decision problem; developing options (or scenarios, alternatives) of future development; evaluating these options using multiple criteria referring both to expert estimations and stakeholder preferences; and elaborating strategies for future action (see Scholz and Tietje, 2002, pp. 268-269).

Our approach is distinctive to most stakeholder based MCA presented above with respect to three major characteristics (for detailed method description, see below). Firstly, we perform an in-depth system analysis and systematic construction of options applying a 'Formative Scenario Analysis' (Scholz *et al.*, 1995; Scholz and Tietje, 2002; Wiek *et al.*, 2006). This methodological sound approach should enable a complete and comprehensive picture of the problem and potential options – both prerequisites of a rational decision making process (see Gregory *et al.*, 2005). This stands in contrast to other stakeholder based MCA, some of them explicitly stating that there "is no formal way of constructing a list of possible alternatives" (Lahdelma *et al.*, 2000, p. 598). Secondly, we perform systematic comparisons of various evaluations: among different stakeholder groups as well as between stakeholders' preferences and expert estimations as it has only been done in the work by Sheppard and Meitner (2005). This allows the detection of *e.g.* differences in perceptions, areas of consensus or disagreement – essential for an analytical mediation process aspired by the ADN method (Scholz, 2006). Thirdly, we developed our approach as an ongoing learning process offering various opportunities for learning (*e.g.* several stakeholder

workshops to present and discuss intermediate results; see for one of the very few examples along these lines: McDaniels and Gregory, 2004). This seems to us essential when facing complex decision problems seeking a sustainable development.

We have applied our approach in the fields of *e.g.* sustainable transport (Loukopoulos and Scholz, 2004); urban development (Scholz *et al.* 1996; Scholz *et al.*, 2004); rural development (Scholz *et al.*, 2003); and regional clustering (Scholz and Stauffacher, 2006), and are presenting here a case study on STD in the Seychelles.

4 Case study in the Seychelles

4.1 The case

Some 115 islands and atolls belong to the Republic of Seychelles, which are located in the western Indian Ocean, northeast from Madagascar (see Figure 6). The islands cover an area of 455 km^2 and are divided into "inner" and "outer" islands, many still uninhabited. With the exceptions of Bird and Denis Island, the inner islands have granite bedrock, while the outer islands are of coralline structure. Mahé, Praslin and La Digue belong to the inner islands and build the nucleus of the archipelago. Mahé with a land area of 154 km^2 is the main island of the Seychelles, with Victoria – the capital of the Seychelles.

First settled by the French (1742) and later taken over by the British (1814), the Seychelles became an own crown colony under British rules in 1903. On 29th of June 1976, the independence of the Seychelles Republic was proclaimed. In 1977, the prime minister seized the power by organising a coup d'Etat and created a socialist state with a one party system. Parliamentary democracy was re-established in 1993. Most of the residents are Roman Catholic and speak Creole, a language very close to French. The mid-year population size in 2001 was 81,202, with 39,973 males and 41,229 females (MISD, 2003). 98% of the population is living on the three main islands: 88% on Mahé, about 8% on Praslin and about 2.6% on La Digue.

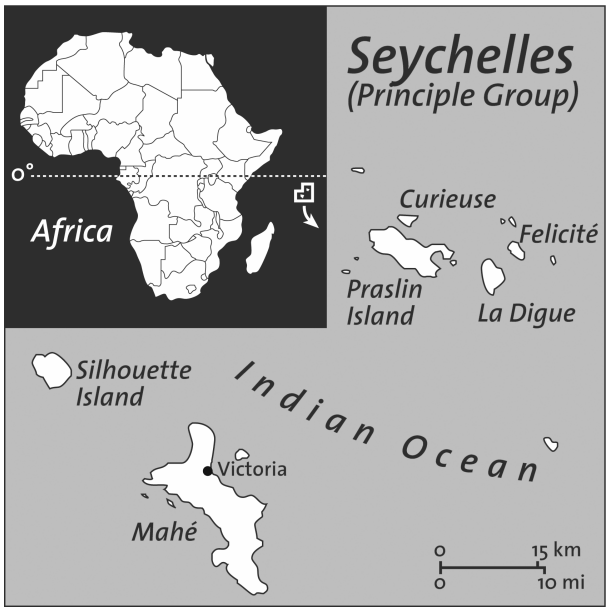

Figure 6. The Seychelles

In 2002, the Gross Domestic Product (GDP) was estimated to be about US$ 690 million (MISD, 2003), a GDP per capita of US$ 8,500 (rank 36 in the world). Relevant tourism began with the opening of the international airport in 1971 and emerged in the 1980s as the most important economic sector. The number of visitors passed from about 3,000 in the late 1960s to more than 70'000 in the late 1970s and stabilised at about 125,000-130,000 since the middle of the 1990s (Table 7). The tourism sector employs 18% of the total workforce and provides more than 70% of hard currency earnings.

The actual project area, La Digue Island, is the fourth largest island of the Seychelles and is situated at about 50 km on the northeast side of Mahé. The area of La Digue is 981 hectares, with a maximal length of 5 km and a maximal width of 3.5 km. The island is hilly, flat land is rare, and thus the topography a major constraint for the economic development (MTT, 2000). As a consequence, most activities take place on the plateau area, in the coastal zone (Lundin and Lindén, 1995). In 2002, a census counted 2099 people (MISD, 2003) on La Digue. In 1999 the 'La Digue Development Board' (LDDB) was created, a semi-autonomous authority, which plans the future development of the island. The LDDB is divided in three sub-committees: architecture and construction; tourism and transport; and environment.

Table 7. Basic data on the tourism industry in the Seychelles 1980-2002 (Sources: MTT, 2000; MISD, 2003)

Year	*Number of visitor arrivals*	*Average length of stay (nights)*	*Hotel bed occupancy rate (%)*	*Income from tourism (million rupees)*	*Average expenditure per diem per visitor (rupees[9])*
1980	71,762	9.0	56	330.9	512
1985	72,542	11.0	62	335.7	421
1990	103,770	10.1	67	645.5	616
1995	120,716	9.5	53	466.3	407
2000	130,046	10.4	52	600.0	445
2002	132,246	10.1	51	706.4	531

In 1987, there was no more than one hotel and two guesthouses on the entire island with a total of less than 100 beds. Between 1987 and 1997, 20 new hotels and guesthouses have been built (MLUH, 1999), and totalling to around 500 beds in 2003. The tourism industry became by far the most important one on the island and according to interviews with people from local economy probably contributes to a much higher extent to the regional GDP than elsewhere in the Seychelles. According to commercial ads, the island's strengths are its calm and relaxed atmosphere, where the main transport mode is the ox-cart and the bicycle. The frequent connections by boat between Praslin and La Digue make tourists visiting La Digue for a day trip and on average stay for 2-3 days only, totalling to about 34'000 overnight stays and further 55'000 day tourists per year (estimations based on personal interviews with hotel managers, tourist officials, and local tour operators).

4.2 Objectives and research questions

Small Island Development States (SIDS), like the Seychelles are fragile ecosystems, which are often economically dependent on tourism. Typical characteristics of SIDS are their geographical isolation, their small physical size, the ecological uniqueness, limited natural resources, susceptibility to climate change and sea-level rise, their high imports and small economies

[9] 1 Rupee corresponds to roughly 0.2 US dollars

with limited diversification (Ghina, 2003; Neto, 2003). Tourism development in SIDS can thus have both beneficial and detrimental effects: on one side, it increases foreign exchange earnings and contributes to national wealth; on the other hand, it can harm the environment, endangering the ecosystem and at the same time one of its most important capitals for tourism demand (WTO, 2002). Because of the ecological fragility and the economic vulnerability of SIDS, it is of huge importance for them to search for sustainable development options.

In the year 2000, the Ministry of Tourism and Transport (MTT) presented a tourism strategy emphasising the need for sustainable development options (MTT, 2000). It is in the frame of this strategy, that MTT initiated this project. The overall objective was to initiate a collaborative planning process for STD on La Digue Island. Specifically, we wanted to find out:

(1) On substantive level:

> (a) What different scenarios of tourist infrastructures and products on La Digue Island are possible?
>
> (b) What impacts do these future scenarios have on local economy, society and environment?
>
> (c) What are the preferences with respect to these future scenarios from demand side namely by present tourists and from those most directly concerned, the local community?

(2) On process level, we wanted to integrate a broad range of stakeholders from national ministries, local administration, tourism industry, visiting tourists as well as from local community. By their very integration into the process, we were interested to achieve a 'mutual learning process' among all involved. At the same time, we wanted to find out, how our transdisciplinary case study approach can be applied in STD, how it works and what challenges arise.

Table 8. Area Development Negotiation within a transdisciplinary case study design for STD in the Seychelles.

Step	*Description*	*Stakeholder involvement*
(1) Defining a guiding question (Scholz and Tietje, 2002, pp. 84-86, pp. 268-9)	The research team in consultation with stakeholders from MTT defined the following guiding question: "How can tourism be developed on La Digue to allow for a sustainable development of the island?"	5 stakeholders from MTT
(2) System Analysis (Scholz and Tietje, 2002, pp. 48-54, 87-88, 241-6)	The analysis of the system characteristics enables to determine important structures and dynamics of the research area. Through literature review, expert interviews and a survey among tour operators, we described the current state of the tourism development in the Seychelles and on La Digue. Further, we undertook a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis. In two working groups, we developed a final set of 15 impact factors considered relevant and sufficient to describe the current state of the system. Impact matrixes, system grids, Mic-Mac-Analysis, system graphs deepened our understanding of the system and its dynamics (for details, see Scholz and Tietje, 2002).	Expert interviews and tour operator survey with 54 persons Working group 1 with 5 environmental experts Working group 2 with 9 experts from tourism sector
(3) Creating scenarios using Formative Scenario Analysis (FSA) (Scholz and Tietje, 2002, pp. 105-116; see as well Wiek *et al.*, 2006)	We defined two to three levels of development for a sub sample of 12 impact factors. A scenario then is defined as a complete combination of levels of all impact factors. Using consistency analysis those scenarios exhibiting high inconsistency scores were discarded. The final selection of four scenarios was done jointly with a group of stakeholders.	Scenario workshop with 40 persons concerned by tourism development on La Digue
(4) Multi-criteria Analysis (Scholz and Tietje, 2002, pp. 143-173, 197-224)	We derived a small set of nine evaluation criteria in consultation with stakeholders. We applied two different approaches of MCA: (i) calculations based on data, literature and expert interviews (data based evaluation MCA I); (ii) two stakeholder groups – 20 tourists and 21 people living on La Digue – provided assessments (stakeholder based evaluation, MCA II). MCA II evaluation were made in two steps: overall 'holistic' and still intuitively, but using the criteria from the MCA I.	Working group 1 (see above) to discuss and choose criteria 19 expert interviews in MCA I 41 face-to-face interviews (20 tourists, 21 inhabitants) in MCA II
(5) Results discussion, strategy development (Scholz and Tietje, 2002, pp. 114-115, 268-269)	We discussed jointly with stakeholders the results of the above steps in a workshop and developed ideas for future action.	Three result workshops and presentation to the government (in total more than 40 persons)

4.3 Methodological approach

The key elements of the present study were (see Table 8): (i) defining a guiding question; (ii) system analysis and (iii) scenario construction by the method of Formative Scenario Analysis (FSA); (iv) conducting a Multi-Criteria Analysis (MCA) by both referring to science based arguments (MCA I) and by obtaining individual preferences from different stakeholder groups (MCA II); and finally (v) discussion of the results and strategy development.

4.3.1 Scenario construction: combination of different levels of impact factors to construct future scenarios based on a thorough system analysis

According to the FSA method, impact factors describe the current state of the investigated case and its dynamics, and thus influence the future development (Scholz and Tietje, 2002, pp 89-92) – in our case that of tourism on La Digue. Moreover, with reference to the guiding question (see Table 8), the set of impact factors covers as well issues relevant for a sustainable development of the whole island not just those for sustaining tourism industry (Butler, 1999). Thus, these impact factors allow us to analyse the present situation ('system analysis') as well as in a subsequent step to construct different future scenarios. The set of impact factors should be sufficient following "the satisficing principle, rather than the optimizing, principle" (Scholz and Tietje, 2002, p. 83), i.e. as precise as necessary to answer the research questions.

The final set of 12 impact factors and their respective levels for possible future development can be found in Table 9. This set was used to build future scenarios by combining individual levels of each impact factor, checking carefully for existing inconsistencies in all pairwise combinations of levels based on a consistency analysis (Scholz and Tietje, 2002, pp 104-113).

The scenarios are used as research tool to investigate possibilities and challenges of future development and differences in preferences of different stakeholder groups. Hence they should support the learning process and serve as decision aid tool. Therefore not probability but possibility of the scenario was decisive (Scholz and Tietje, 2002, p. 80). Scenarios should cover the 'possibility space' securing that all potential future developments are addressed.

Table 9. The final set of 12 selected impact factors with their respective levels for future development. The impact factors are structured with reference to infrastructure (Inf), economy (Econ), politics (Pol), society (Soc), and environment (Env). Combinations of levels were used to construct scenarios.

Impact factor	*Description*	*Level of future development*[10]
Accommodation (Inf)	Number of tourists beds in large hotels, small hotels and self-catering.	a) constant or decrease b) low increase c) high increase
Tourism products and services (Inf)	Range of attractions, activities and facilities for tourists	a) wide variety b) low variety
Transport on the island (Inf)	Means of transport on the island and length of roads.	a) number of motor vehicles stable or decreases; length of roads system constant b) number of motor-vehicles and length of roads increase
Income generated (Econ)	Total income generated by the number of labour forces in the tourism sector on La Digue.	a) constant or decrease b) increase (further differentiated by large and very large)
Enforcement of laws and regulations (Pol)	Existence of resources (trained staff and funds) to enforce existing laws and management guidelines.	a) high level, strict enforcement b) low level, weak enforcement
Environmental awareness of population (Soc)	Awareness of the local population of the ecosystem. Enforcement of environmental education and collaboration in STD.	a) high level b) low level
Population density (Soc)	Number of persons per square kilometre and the distribution of the population over the island.	a) constant b) increase (further differentiated in by 'large')
Culture and tradition (Soc)	Importance of traditional activities.	a) promotion (further differentiated by 'strong') b) no promotion
Water supply (Env)	Capacity of the water catchments areas and of groundwater for the supply of drinking water.	a) Water supply guarantees 80% or more of water demand guaranteed b) Below 80% of water demand guaranteed
Rare native animal species (Env)	Diversity of rare native plant and animal species in La Digue.	a) constant or increase b) decrease
Coastal erosion (Env)	Decrease of the coastal areas, because of natural and/or anthropogenic factors.	a) less than 30% of coastal area is critically endangered b) more than 30% critically endangered
Landscape aesthetics (Env)	Natural areas with a characteristic aesthetic value.	a) preserved b) not preserved

[10] Most of the levels were quantitatively described to allow for data based evaluation (for details see Günther, 2004)

4.3.2 MCA I: using criteria for data based evaluation of scenarios

To allow the multi-criteria assessment of the scenarios, a set of evaluation criteria was developed following again the satisficing principle (Table 10). The criteria respected the following properties: "They should be relevant for the topic, information on them should be available, and they should be relevant for the decision" (Scholz and Tietje, 2002, p. 160). We used the criteria primarily in the data based evaluation (MCA I) and additionally in the stakeholder based evaluation (MCA II) – assessing preferences from stakeholder groups (for details see below). In the MCA I we were using information from literature and expert interviews. In total 19 expert interviews were carried out; nine of them as face-to-face interviews, ten using telephone or email. Experts were coming from different ministries in the Seychelles, local tourist industry, international tour operators and the ETH Zurich.

To allow the aggregation of criteria based results, these were normalised between 0 and 1 (the worst scenario received a value of 0, the best scenario a value of 1, and those in between where extrapolated linearly). We refer to these normalised results as 'utility'. In contrast to other MCA studies, we did not weight criteria individually but gave all the same weight when computing sum scores.

We distinguish hence between impact factors describing future scenarios and criteria used to evaluate these. This in contrast to other MCA methods which use just one set of 'objectives' which are both used to describe and assess outcomes of scenarios (in fact without even distinguishing between description and evaluation, see *e.g.* Ananda and Herath, 2005; McDaniels and Trousdale, 2005; Reichert *et al.*, 2005). This is due to a different approach we apply in assessing stakeholders' preferences. Whilst others elicit utilities or values from stakeholders with respect to expert based outcomes, we elicit utilities from stakeholders without disclosing the evaluation results but just providing detailed description of the scenarios. In most cases there exists of course a link between impact factor and evaluation criteria – mostly indirect, sometimes complex demanding several calculations. This different procedure allows us the direct comparison of stakeholder and data based evaluation, without giving the latter more prominence than the former. We do deliberately not refer to these two forms of evaluation as 'objective' and 'subjective' but prefer the term

'constructive' as both are but different ways of constructing the reality (Belton and Pictet, 1997, Stauffacher *et al.*, 2006).

Table 10. The final set of 9 selected evaluation criteria used both for MCA I and MCA II. The criteria are structured with reference to economy (Econ), socio-cultural (S-C), and environment (Env).[11]

Criteria	*Measurement in MCA I*
Economic wealth (Econ)	tourists' yearly expenditures [SR/year]
Employment (Econ)	number of jobs in tourism [#]
Regional economic flow (Econ)	ratio of local products used in tourism [%]
Overcrowding (S-C)	number of tourist per 100 m accessible beach [#/100m]
Potential of socio-cultural conflicts (S-C)	ratio of migrant workers in tourism [%]
Preservation of traditions (S-C)	number and type of traditional products in tourism [qualitative rating from -2 to +2]
Resource use (Env)	total water demand [m3/day]
Land use (Env)	built-over area [ha]
Protection of endangered species (Env)	size and number of ecosystems [qualitative rating from -2 to +2]

4.3.3 MCA II: face-to-face interviews for stakeholder based evaluation

The second author carried out face-to-face interviews with a total of 41 persons (20 tourists, 21 from the local community) on six days in December 2003. For the local community, she interviewed persons working either in tourism or in other fields; on the other hand, tourists using different accommodations facilities (hotels, guesthouses and self-catering) as well as day tourists were covered. Whenever possible, she chose people from different age range (convenience sample with quotas). Mean age of tourists was 37.7 (standard deviation 9.2) and of local community 32.1 (standard deviation 10.9). In the tourist group, there was equal number of males and females; in the local community there was one more male than female.

[11] Further details of the evaluation can be found in Günther (2004).

Among the tourists, four stayed just for one day, two for two or three days and the rest for four days and more.

Each interview lasted between 30 and 40 minutes. The procedure and questionnaire used have been thoroughly pre-tested and successfully implemented in several comparable studies in Switzerland and Sweden (Loukopoulos and Scholz, 2004; Scholz and Stauffacher, 2006). In the interview, the researcher presented initially the goals of the study and the four scenarios in a descriptive and visualised form. Then two rounds of scenario evaluations were carried out: overall 'holistic' and criteria based. For the 'holistic' evaluation, the respondents ranked firstly the scenarios from one to four and then rated each scenario individually between 0 (= worst) and 100 (= best). This 0-100 scale "offers greater discriminatory power […] attention is focussed on the relative differences between alternatives so that the rating is not simply ordinal" (Joubert *et al.*, 1997, pp. 135). In the criteria based evaluation, the respondents rated each scenario nine times using the criteria presented above, using the same 0-100 score. I.e. the respondents provided in total eleven evaluations for each scenario.

As outlined above, we elicited from respondents 'utilities' of different scenarios and not of outcomes of scenarios. Furthermore, we applied a direct measurement and we did not use more subtle techniques like *e.g.* pairwise comparison, outranking or mid-value splitting (see *e.g.* Ananda and Herath, 2003; Kangas and Kangas, 2005). This choice was deliberate, as these techniques are more time consuming and complex, hence involve a greater risk of cognitive overload for respondents and most importantly are less transparent (Joubert *et al.*, 1997). According to the review of different MCA methods by Kangas and Kangas (2005), our approach could best be described by the Simple Multi-Attribute Rating Technique (SMART). Again, to compute sum scores, all criteria were equally weighted. No normalisation of results was necessary, as 'utilities' were elicited (all results were already between 0=worst and 100=best).

Finally, the stakeholders were asked to fill in a short questionnaire on some personal information (*e.g.* age, sex, accommodation details for tourists). All data from the interviews were analysed with SPSS (Statistical Package for the Social Science). For differences between groups, unpaired t-tests; and for differences between overall 'holistic' and criteria based evaluation, paired t-tests were used.

5 Results

Table 11. The formatively constructed scenarios for future development of tourism on la Digue

Impact factor	*Present situation*	*Scenario 1 Free Development*	*Scenario 2 Creole Style*	*Scenario 3 Nature Preservation*	*Scenario 4 Five-star Eco-tourism*
Accommodation	23 hotels and guest houses 414 beds	high increase 900 beds	low increase 574 beds	stable 420 beds	low increase 500 beds
Tourism products and services	low variety	wide variety	wide variety	low variety	wide variety
Transport on the island	45 motor vehicles, 20 km road	more motor vehicles, road extension	less motor vehicles, roads unchanged	less motor vehicles, roads unchanged	less motor vehicles, road extension
Income generated by labour forces in tourism	11 Mio SR	very large increase	stable/ small increase	stable/ small increase	large increase
Enforcement of laws and regulations	weak	weak	strict	strict	strict
Environmental awareness of population	low	low	high	high	high
Population density (person/ hectare)	1.9 p/ha	large increase	stable/ small increase	stable/ small increase	large increase
Culture and tradition	not promoted	not promoted	strongly promoted	promoted	not promoted
Water supply	90% supply guaranteed	less than 80%	less than 80%	more than 80%	less than 80%
Rare and native animal species	diverse	decrease	stable	increase	stable/ low increase
Coastal erosion	26% critically endangered	more than 30%	less than 30%	less than 30%	less than 30%
Landscape aesthetics	great heterogeneity	low heterogeneity	great heterogeneity	great heterogeneity	great heterogeneity

5.1 Four future scenarios for tourism development on La Digue

Four different future scenarios are presented in Table 11 together with the present situation. All are described with reference to our twelve impact factors described above. Additional information was made available by an estimation of the number of tourist arrivals per year together with experts

from local tourist industry, which gave the following (at present 34,000 overnight stays, 55,000 day tourists): scenario 1 with 72,000 overnight stays and 72,000 day tourists; scenario 2 with 47,000 and 55,000; scenario 3 with 35,000 and 73,000; scenario 4 with 40,000 and 37,000 respectively. As vignette, we refer to scenario 1 as *Free Development*, scenario 2 as *Creole Style*, scenario 3 as *Nature Preservation*, and scenario 4 as *Five-star Eco-tourism*. The consistency analysis revealed no inconsistencies for the four scenarios.

Table 12. Data based evaluation of the four scenarios (MCA I). Utility values are given to allow comparisons between different criteria and the computation of simple sum scores.

Evaluation criteria	*Scenario 1 Free Development*	*Scenario 2 Creole Style*	*Scenario 3 Nature Preservation*	*Scenario 4 Five-star Eco-tourism*
Economic wealth (tourists' yearly expenditures)	1	0.06	0	0.44
Employment (number of jobs in tourism)	1	0.35	0	0.62
Regional economic flow (ratio of local products used in tourism)	0.11	1	0.56	0
Subtotal economic utility (rank)	*2.11 (1)*	*1.41 (2)*	*0.56 (4)*	*1.06 (3)*
Overcrowding (number of tourist per 100 m accessible beach)	0	0.79	0.95	1
Potential of socio-cultural conflicts (ratio of migrant workers in tourism)	0.40	0.95	1	0
Preservation of traditions (traditional products in tourism)	0	1	0.67	0.33
Subtotal socio-cultural utility (rank)	*0.40 (4)*	*2.74 (1)*	*2.62 (2)*	*1.33 (3)*
Resource use (water demand)	0	0.71	1	0
Land use (built-over area)	0	0.87	1	0.13
Protection of endangered species (size/ number of ecosystems)	0	0.25	1	0.75
Subtotal environmental utility (rank)	*0 (4)*	*1.83 (2)*	*3.00 (1)*	*0.88 (3)*
Overall total utility (rank)	*2.51 (4)*	*5.98 (2)*	*6.18 (1)*	*3.27 (3)*

5.2 Data based evaluation of the scenarios (MCA I)

Table 12 presents the results from the data based evaluation. Several conflicting goals become evident from this first assessment: (1) whilst scenario 1 is best from an economic point of view, it ranks fourth with respect to the environmental, socio-cultural criteria and overall; (2) scenario 3 is worst evaluated by economic criteria, but best in environmental quality, second best from a socio-cultural perspective, and best overall.

5.3 Stakeholder based evaluations of the scenarios (MCA II)

Table 13 presents the results from the stakeholder based evaluations. Generally speaking the results are similar to those from data based evaluation reported above. Again, scenario 1 and 4 are strong on economic criteria, but weak in the others as well as overall. Scenario 2 and 3 are most preferred, with scenario 3 especially in environmental criteria.

Table 13. Overall and criteria based evaluation of the four scenarios by two stakeholder groups (MCA II). Given are mean utility and rank in parentheses. Subtotals summarize criteria along the structure used in Table 10.

Assessment method and stakeholder group	*Scenario 1 Free Development*	*Scenario 2 Creole Style*	*Scenario 3 Nature Preservation*	*Scenario 4 Five-star Eco-tourism*
Overall 'holistic' evaluation				
Tourists (N = 20)	0.13 (4)	0.76 (2)	0.86 (1)	0.37 (3)
Local Community (N = 21)	0.37 (4)	0.77 (1)	0.75 (2)	0.37 (3)
Criteria based evaluation, total				
Tourists (N = 20)	0.36 (4)	0.70 (2)	0.76 (1)	0.54 (3)
Local Community (N = 21)	0.47 (4)	0.61 (2)	0.65 (1)	0.54 (3)
Criteria based evaluation, subtotal economic criteria				
Tourists (N = 20)	0.66 (2)	0.63 (3)	0.50 (4)	0.67 (1)
Local Community (N = 21)	0.68 (1)	0.59 (3)	0.54 (4)	0.67 (2)
Criteria based evaluation, subtotal socio-cultural criteria				
Tourists (N = 20)	0.33 (4)	0.72 (2)	0.74 (1)	0.53 (3)
Local Community (N = 21)	0.44 (4)	0.65 (2)	0.71 (1)	0.54 (3)
Criteria based evaluation, subtotal environmental criteria				
Tourists (N = 20)	0.22 (4)	0.62 (2)	0.99 (1)	0.44 (3)
Local Community (N = 21)	0.29 (4)	0.60 (2)	0.76 (1)	0.43 (3)

Furthermore, we can observe the following. Differences between scenarios are smaller in criteria based than in overall evaluation, *e.g.* utility values for scenario 1 and 4 in criteria based evaluation are significantly higher than in overall evaluation (two paired t-tests, both with $p < 0.01$). The ranking order of scenario 2 and 3 is different between tourists and local community, though the differences in utility are small. There is a significant difference between tourists and local community for scenario 1, both in overall as well as in criteria based evaluation (two t-tests, both with $p < 0.05$). A detailed inspection shows that this is mainly due to different perception of socio-cultural consequences. Less pronounced but still marked differences exist between stakeholder groups in the criteria based evaluation of scenario 2 and 3 (two t-tests, both not significant with $p < 0.10$).

6 Discussion

We split our discussion in two parts according to our main research questions: 'substantive' with respect to STD in the Seychelles; and 'process' addressing the applied analytical and systematic approach for collaborative planning in STD.

6.1 Substantive level: STD in the Seychelles

6.1.1 Four developed scenarios as four distinctive forms of STD in the Seychelles

According to Hunter's four models of STD (1997), our four scenarios could be described as tourism imperative (*Free Development*), environmental-led tourism (*Creole Style*), neotenous tourism (*Nature Preservation*) and product-led tourism (*Five-star Eco-tourism*), respectively. Following Hunter, one would prefer the second scenario, as this is best used in "areas seeking a new market niche" (1997, p. 862), but not the first as La Digue is certainly not a place with "degrading current economic activities" (*ibid.*, p. 860). As tourism on La Digue is certainly not "largely devoid of tourism activity" (*ibid.*, p. 862), as well neotenous tourism as in the third scenario would be inadequate in Hunter's view. In contrast to Hunter, we are able to give here more informed guidance by the subsequent evaluations.

6.1.2 Data based evaluation indicates several goal conflicts in the scenarios

The data based evaluations produced some notable results: whilst the scenario *Free Development* was best from an economic point of view, it was worst with respect to environmental and socio-cultural criteria. Hence, a trade-off is necessary between economic success and environmental or socio-cultural sustainability – a fact often neglected in tourism or camouflaged by the term 'balance': "a suitable balance must be established between these three dimensions" (WTO, 2004b). This became as well visible with the scenario *Nature Preservation*, which was from an economic perspective not promising but at the same ranked best with environment and second in socio-culture. Within certain contexts, one dimension might be more important and therefore actually a temporary imbalance the best goal (Casagrandi and Rinaldi, 2002; Hunter, 1997), yet neither do we have a degrading economic situation nor is La Digue at present devoid of tourism activity. On the other hand, the scenario *Creole Style* was ranked best in socio-cultural, second in environment, economy and overall. Thus, an environmental-led tourism focussing on certain market niches like culture and tradition seems a promising option for La Digue. Of course the reservation against such approaches with reference to commodification of nature and culture remains (see *e.g.* Aas *et al.*, 2005; King and Stewart, 1996; McAfee, 1999). Yet, the protection of the environment bears costs – direct costs as well as opportunity costs through the non-use of areas – which can hardly be coming from other sources in SIDS than from tourism (see for a discussion of some counter arguments Gössling *et al.*, 2002).

We concur with Gössling and colleagues that "upper class hotels seem to have a substantially larger ecological footprint than guesthouses" (2002, p. 208), a fact well illustrated by our evaluation of the scenario *Five-star Eco-tourism*. Furthermore in this segment of tourism, it has been documented elsewhere that money leakage due to the predominance of imported products in food, beverages as well as in material for construction and furnishing actually hampers the economic benefit locally (Hampton, 1998; 2005; Mowforth and Hunt, 1998).

6.1.3 Tourists and local community agree on most preferred form of tourism

Preferences from both tourists as well as local community elicited the same goal-conflicts as our data based evaluation: in scenario *Free Development* and *Five-star Eco-tourism* they expect good economic yield, but see them at

the same time as undesired from an environmental or socio-cultural perspective. For both stakeholder groups the trade-off here was clear cut: they ranked these two scenarios last in the overall evaluation. Yet, in the refined criteria based evaluation, the difference between the scenarios became smaller, a clear sign that they were really pondering pros and cons in a more differentiated manner than in a quick overall rating. Very small differences became evident in the preference for scenario *Creole Style* and *Nature Preservation* though tourists rated the later slightly better but not the local community. Both scenarios seem preferable to the consulted stakeholders. Overall the preferences of the two stakeholder groups are astonishingly similar and there seems to be no conflict between present tourists and local community with respect to the preferred form of tourism.

6.2 Process level: collaborative STD process

6.2.1 Formative system analysis and scenario construction allows for a sound problem perception to guide the subsequent MCA

By describing the present situation and future scenarios both referring to tourist infrastructure and to general socio-economic development on La Digue, we gained a comprehensive picture of future development – a key for subsequent evaluations of sustainable development on the island and not merely of the tourism projects (Butler, 1999). These complete and understandable pictures of the problem and potential options are in fact prerequisites of a rational decision making process (Gregory *et al.*, 2005).

One shortcoming of the implementation of FSA in the present study has to be acknowledged. Within the restricted project time, we applied consistency analysis to assess potential inconsistencies in the four scenarios defined together with stakeholders and fine tune them. A detailed inspection of all possible combinations of levels of different impact factors would have probably given some further scenarios worth to be inspected (Tietje, 2005; Wiek *et al.*, 2006). Hence the full potential of the FSA was not exploited. An alternative approach has been followed by other researchers, who stress the iterative character of a stakeholder based MCA by creating new alternatives based on the evaluation results (see *e.g.* Reichert *et al.*, 2005; McDaniels and Gregory, 2004; Joubert *et al.*, 1997).

6.2.2 In a stakeholder based MCA data based evaluation necessitates simplification but still helps inspecting trade-offs

As we illustrated above, our study allowed the detection and inspection of goal conflicts and necessary trade-offs between different scenarios, yet several challenges with our approach need to be acknowledged.

Evaluating scenarios from multiple perspectives is a real challenge. Even more when the criteria set has to be used for preference ratings with lay people. Some reservations or even resistance from side of technical experts will usually emerge. They sometimes are hesitantly providing data – when they have to "'boil down' their research findings" for a simple overall score (Sheppard and Meitner, 2005, p. 183), that does not cover more complex interactions present between different criteria. An alternative approach would have been to use a hierarchical set of criteria and present stakeholders only with those at a higher level but using for data based evaluation more detailed, lower level criteria linked in a sophisticated complex system model (see for this approach Reichert *et al.*, 2005).

Especially the economic results seem vulnerable in our data based evaluation, as we detected in subsequent sensitivity analyses (see Günther, 2004). A sound cost-benefit analysis would have been more appropriate (Gössling, 1999), but was impossible due to lack of data and resources. Still the achieved results seem plausible in their tendencies. One might suspect that the economic utility of scenario 2 is overestimated. It looks, however, reasonable if we weigh it against detailed simulation analyses that showed the economical benefit of nature based tourism (Huybers and Bennett, 2003).

The determination of utility functions to overcome incommensurability is a crucial step in MCA. We opted for a linear one, though others prefer *e.g.* concave functions (Pavlikakis and Tsihrintzis, 2003). Sensitivity analyses showed that final results were robust to changes in the utility function, especially where large differences were present. This exemplifies, however, that we have not addressed systematically uncertainties in data and evaluation throughout the study. To this end, other methods would be necessary (Balasubramaniam and Voulvoulis, 2005; see the work of Regan *et al.*, 2005 for one promising approach).

All in all, no absolute measurement of STD for the scenarios was possible but rather relative comparing different scenarios. This was enough for the aim of our study. Such a simple measurement would certainly not be sufficient for an encompassing evaluation of STD. The ongoing controlling process of a STD necessitates a broader set of criteria offering greater details to allow for the actual fine tuning of the process (see *e.g.* Ko, 2005; Miller, 2001; Twining-Ward and Butler, 2002; WTO, 2004a).

6.2.3 Stakeholder based evaluations help unravelling areas of consensus or disagreement but put high demands on stakeholders

In a stakeholder based MCA trade-offs between different criteria and stakeholder groups become visible – a prerequisite that existing conflicts could be resolved (Balasubramaniam and Voulvoulis, 2005; Joubert *et al.*, 1997). As we have shown above, no real disagreements could be detected among the two included groups.

However, due to resource restrictions, we collected data from a restricted number of persons only. It would have been preferable to collect data from bigger groups of persons to allow for detailed inspection of sub-groups comparing *e.g.* different tourist or age groups with a view to discover conflicts concealed by averaging results over the predefined groups (Belton and Pictet, 1997). To answer our research question – comparing preferences between present tourist and local community – it was, however, sufficient.

In some interviews, we got the impression that the evaluation process for few persons was probably too complex and abstract – a fact well known in stakeholder based MCA (Joubert *et al.*, 1997; Russell *et al.*, 2001; Sheppard, 2005; Sheppard and Meitner, 2005). There was sometimes an additional problem of language, though the principal researcher was able to conduct interviews in German, English and French, but some residents speak only Creole. These very facts together emphases the importance of appropriate visualisation of scenarios, understandable criteria and straightforward elicitation of preferences for a beneficial stakeholder based MCA (Sheppard, 2005; Sheppard and Meitner, 2005). Other methods like *e.g.* outranking, pairwise comparisons would have been methodologically more promising, yet need more time, are more complex, are therefore less transparent and not attune to stakeholder based approaches (Joubert *et al.*, 1997).

6.2.4 ADN as enhanced stakeholder based MCA to foster an ongoing learning process

For the whole process a systematic approach using ADN as structuring tool was crucial and is comparable with other stakeholder based MCA (Brown *et al.*, 2001; Kangas and Kangas, 2005; Mendoza and Prabhu, 2005; Pavlikakis and Tsihrintzis, 2003; Sheppard, 2005; Sheppard and Meitner, 2005). In contrast to less analytic and systematic approaches of collaborative planning (*e.g.* Forester, 1989; Healey, 1998; Innes, 1998; Sager, 1994), stakeholder input is documented and can be followed in the further process, hence transparency of stakeholder participation is guaranteed – an important factor for the success of a stakeholder based MCA (Balasubramaniam and Voulvoulis, 2005; Joubert *et al.*, 1997).

Compared with other stakeholder based MCA our ADN within a transdisciplinary case study design offers at least four distinctive elements. Firstly, the joint problem definition at the beginning seems to use crucial as here a first step towards true collaboration (Arnstein, 1969) and joint ownership of the problem was made. In many of the other stakeholder based MCA this step is made by the research team or the principal alone. Secondly, the comprehensive, context rich description of present situation and future scenarios allowed not only subsequent evaluation but gave important insights for the problem understanding and helped finding scenarios where the evaluation outcome was not evident. Thirdly, we would like to stress the equal footing of data based and stakeholder based evaluation in our approach: so can *e.g.* the first points out differences in perceptions of the second or the latter can help identifying inadequate models or system boundaries of a data based evaluation. Both together will certainly provide more robust results of the MCA. Last not least, we would like to stress the learning process inherent in our approach.

The very process of assessing the present situation; developing future scenarios; and their detailed evaluations actually can induce a learning process. It can empower and motivate stakeholders to contribute more actively in a subsequent implementation or other decision processes, an outcome documented in similar studies (Brown *et al.*, 2001; Sheppard and Meitner, 2005). As McDaniels and Gregory (2004) demonstrate stakeholder based MCA can have a learning effect but for a successful learning process, learning has to be explicitly defined as objective of the project and a performance measure for the learning objective to be specified. Yet, as

neither of this has been followed in our project, we are not able to provide here a sound answer as to how much learning actually took place. Referring to one of the performance measurements proposed by McDaniels and Gregory (2004, p. 1923: "number of opportunities created for experimental learning"), we just list few of the elements where learning has potentially taken place: discussion and definition of guiding question with experts from MTT; presentation and discussion of system analysis in two working groups; presentation, discussion and fine tuning of scenarios in one big workshop; presentation, discussion and adaptation of evaluation criteria in one working group; stakeholder based evaluation by tourists and local community; and discussion of end results in three workshops. All in all more than 150 persons participated in this multi-stakeholder process and it was in our view certainly possible to induce a mutual learning process among all those involved.

7 Conclusion

7.1 Project as part of an ongoing process towards STD

The project was initiated and supported by local authorities in the Seychelles as part of the long-term strategy in tourism development (MTT, 2000). Since the finalization of the project, it has been followed with the help of 'seed sustainability' by several other projects, *e.g.* a detailed economic input-output-analysis; an analysis of different sustainable tourism labels for the Seychelles; a community based STD in one pilot village just started in 2005. Equally important was a long-term project by the Geobotanical Institute of ETH Zurich which runs for over fourteen years in the Seychelles. This allowed us using already established and trustful contacts in the local industry and national administration. Without that the project would most probably have been failed.

In the Seychelles as in other SIDS, we have a high susceptibility of the ecosystem to anthropogenic changes. This calls for careful approaches in tourism development and planning. Seychelles are an upmarket tourism destination and here STD can and should be given high priority. An important step into this direction has certainly been made by our project. Yet in other regions, potential of STD might be limited. It needs though to be reiterated that sustainable development in mass tourism is the real

challenge that should be addressed on a global perspective (UNEP and WTO, 2005).

7.2 Context matters for STD

As with all collaborative approaches, results can only be successfully implemented or lead to appropriate action if they are embedded in supporting institutional and legal frameworks (Brown, 2003; Tompkins *et al.*, 2002). The relationship between project and state is crucial for the success of such projects (Adger, 2003), i.e. context matters not least in STD (Arajo and Bramwell, 2002; Timothy, 1999a; Tosun, 2000, 2005). How much our project will bear further fruit, will actually depend largely on some major context factors, like *e.g.* strengthening of local level in policy making and the further use of collaborative approaches in the implementation phase. It is worth looking into evaluations made of participatory decision making processes. In fact, more important than the specific technique chosen is an adequate framing of the process set off. The process is questioned "at the moment official support for greater participation often does not seem to be rising from strong cultural depths but feels more like a reluctant response to decision-making difficulties" (Petts, 2004, p. 129). A sincere commitment towards "a true partnership" (Arnstein, 1969) from all parties involved seems indispensable and was certainly one of the key strengths in our project.

7.3 Comprehensive approaches are better

Evaluation studies in the field of participatory decision making have in fact shown that comprehensive approaches using different techniques have been more successful in successfully supporting decisions. Petts (2004, p. 129) concludes that complex decisions "require a decision-support framework in which multiple methods are integrated to allow for multicriteria decision-making with full public participation". Different techniques should complement each other (Fiorino, 1990). With respect to intensity of the process, most studies agree that "more intense forms of stakeholder involvement are more likely to produce higher-quality decisions" (Beierle, 2002, p. 747). It is exactly along these lines that our ADN method within a transdisciplinary case study design lies.

V Case study 3: Learning to research environmental problems from a functional socio-cultural constructivism perspective: The transdisciplinary case study approach[12]

1 Introduction

The transdisciplinary case study (TdCS) is a hybrid combination of learning, research, and application (Scholz, 1995). Within this chapter we will focus on teaching and learning aspects. As we will show, education at the university level – exemplified here in the field of sustainability sciences, but valid for many other fields – cannot follow the traditional didactic schemes still predominating (Ashford, 2004; Gutierrez-Martin and Hüttenhain, 2003; Zoller and Scholz, 2004, 2005). These schemes do not meet the requirements of learning complex problem-solving; for example, in the subject area of sustainable development. Here we are faced with real-world problems that are embedded in the societal context, thus demanding different, more complex skills. We present the transdisciplinary case study as a learning framework based on what we call functional socio-cultural constructivism and project-based learning. In doing so, we try to illustrate the applicability of TdCS to learn competencies and skills necessary to research problems of sustainable development. The learning goals of TdCS differ from the goals of most university courses. They are more comprehensive and include complex problem solving, societal context, and group processes. The ambitious goal is that students become enabled to tackle complex, real-world problems. This, however, is not done as a desk study but in a transdisciplinary setting.

The chapter is structured as follows: We first give an overview on the changing setting and role for sustainability science and derive new requirements for university education. In the second chapter we introduce the concepts of socio-cultural constructivism and project-based learning as

[12] This chapter is based on a paper written in collaboration with A. I. Walter, D. J. Lang, A. Wiek and R. W. Scholz

major parts of our fundamentals. Further on, we present the TdCS and its learning goals, showing how we go beyond the approach of project-based learning. Next, we detail how the teacher-student relationship in the TdCS is affected and how the teacher and the students can cope with the additional requirements. We will sum up with some concluding remarks, addressing several different aspects of the setting-up process and implementation of transdisciplinary case studies as a teaching framework at the university level.

1.1 Changing background for environmental sciences

The field of environmental sciences and environmental decision-making as it is taught at the ETH Zurich was established more than fifteen years ago. It seeks "to contribute to a forward-looking development in respect of a rational use of resources combined with environmental and social compatibility" (Swiss Federal Institute of Technology, 2005). The foundation of the department of Environmental Sciences at the ETH Zurich has been a reaction to an ongoing development in environmental sciences, which especially affects disciplines that investigate the interrelations of human activity and the natural environment systems. Global changes in economy, society, and culture affect how science and, therefore, also how university education is understood. These changes can be characterized by increased complexity, connectedness, and speed of transformations in the research objects. In a rough overview, some of the major developments are as follows[13]:

> *Concept of sustainability*: Sustainable development as first defined by the World Commission on Environment and Development (1987) had a high impact on research and teaching at the university level. Learning about sustainable development and its different facets and interpretations is a goal of many courses and programs at universities worldwide. While there is a great deal of discussion on the exact meaning and implications of the term (Parris and Kates, 2003), there is widespread consensus that sustainability is an integrative concept, tying environmental, socio-cultural, and economic aspects together

[13] For a more detailed discussion on paradigms shift in environmental research, refer to Zoller and Scholz (2004, 2005).

in one framework. In a recently published study on expert views of sustainability (Laws *et al.*, 2004), sustainability is characterized by an ongoing inquiry on efficient resource use in order to keep systems within its functional limits and to respect the needs of future generations.

Increasing complexity: The inherent complexity of real-world systems is increasingly recognized by scientific disciplines. Scientific verification becomes difficult (Ludwig *et al.*, 1993). Particularly in the context of sustainable development, conventional approaches cannot adequately address political and cultural issues, which automatically come into play when researching sustainable development (Hutchcroft 1996).

Globalization: Globalization in its many forms affects the scales on which questions have to be investigated. Global environmental problems like the greenhouse effect or the ozone layer depletion have to be connected to local issues: *e.g.*, urban transport or cleaner production. This adds to the complexity and uncertainty of the problem (Gough, 1998).

Governance: The idea of the central steering of societal processes by planning processes, guided by democratic decisions of the population, has been replaced by the idea of governance. Decisions are made in a process of interaction between concerned stakeholders. It is a cross-scale, multi-level, and interactive process. Different rationalities have to be respected to find potential solutions. Science is no longer respected as delivering "objective" answers; it is just one actor among others (cf. Adger *et al.*, 2003; Kemp and Loorbach, 2003).

Reflexive Modernization: In their seminal work, Beck, Giddens and Lash (1995) presented contemporary society as necessarily reflexive, as problems and solutions can both be products of scientific activity. This implies that a self-reflection loop of sustainability science is necessary. "How sustainable is sustainability science?"

These developments have various implications for the significance, relevance, and acceptance of scientific reasoning and knowledge. Knowledge is much more specific and contextualized. Science is under

increasing pressure to initiate processes to cope with sustainability problems (Funtowicz *et al.*, 1998). This, in turn, affects university education.

1.2 New challenges to university teaching

Traditionally, and still common in universities of our time, teaching followed a sender-receiver model (Jonassen and Land, 2000), and learning a knowledge-acquisition metaphor (Resnick, 1987; Barab and Duffy, 2000). The *teacher* has access to a well-defined and structured *knowledge base*, which represents the material to convey to the student (Figure 7). The student gradually acquires the same knowledge as the teacher and can then apply it. This approach strongly relies on explicit, codified textbook knowledge. We will use this model as a reference to illustrate some important properties of our own approach.

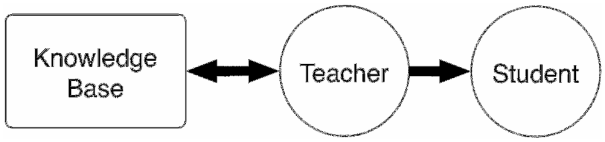

Figure 7. The classical sender-receiver model of teaching still prevailing in university teaching.

In the following discussion we will demonstrate how the above-presented changes provoke university education. We will show that challenges occur mainly in three domains: the subject domain, the domain of the societal context, and the process domain.

1.2.1 Subject area: learning to research complex problems

Environmental problems represent *real phenomena*, which bring about issues such as uncertainty, complexity, and incompleteness of information, but also context and personal experience. Therefore, the knowledge base cannot be treated as well-defined and equally structured for any teacher and student. Learning to research environmental problems means conveying the ability to work with real-world problems in an adaptive way (Figure 8). The methodology has to focus on solving poorly defined problems, where the way to the solution as well as the target state is not completely known (for details, see Scholz *et al.*, 2006). This also implies an active approach on the part of the student, who utilizes his or her own knowledge base directly, learning how to handle and reduce complexity in an interactive process.

From a didactical perspective, the real-world problem provides the starting point, framing, and stimuli for active learning, whereas the teacher takes the role of a facilitator.

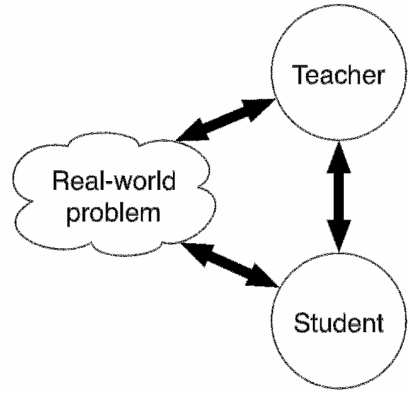

Figure 8. Student and teachers address real-world problems.

1.2.2 Process: learning in teams

One can easily gather from Figure 8 that the interaction and communication process between teachers and students becomes increasingly important; but more crucially, real-world complex problems require an interdisciplinary approach to problem solving, which demands teamwork among a group of researchers. The educational approach, therefore, has to integrate teamwork aspects and integrate students into a project team (Figure 9). This emphasizes the importance of group processes and corresponding methods. An active student role is necessary: They have to be self-organized, actively dividing the problem into sub-tasks and thereby deciding what they can and want to learn. The teaching paradigm changes from "learning by listening" to "learning by doing." The teacher's role changes from a distributor of knowledge to a process manager, helping the students in their learning process by initiating reflection processes and supporting them, if necessary, on substantive matters.

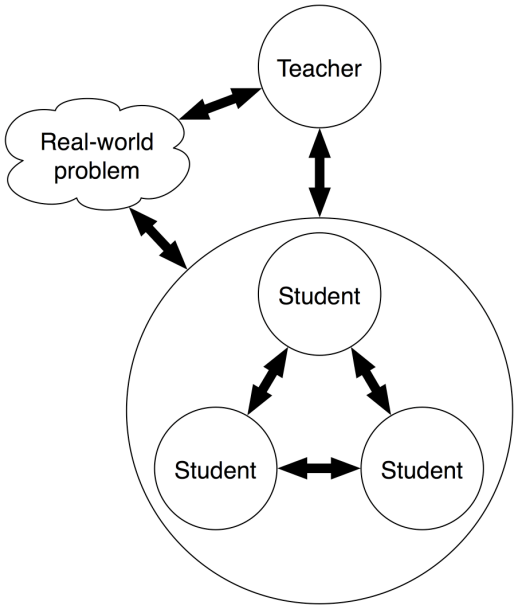

Figure 9. Students work in groups to solve problems.

1.2.3 Societal context: from an (inter)disciplinary to a transdisciplinary approach

Complex real-world problems necessitate that actors or stakeholders from outside the university are integrated into the problem-solving process because they have concrete system knowledge and their preferences are crucial in the implementation process. As they do not all follow the same rationality, their interests and goals influence the perception of the problem (Figure 10). Transdisciplinary research supplements traditional disciplinary and interdisciplinary scientific activities by integrating actors from outside academia. Researchers go beyond science (Scholz, Mieg, and Oswald, 2000). Integration of knowledge from different sources becomes important, where the border between knowledge and interests gets blurred as various types of knowledge are integrated in addition to scientific knowledge. "Reality," as such, is replaced by a constructivist view. Different views of reality need to be negotiated and integrated.

In this transdisciplinary approach, the teacher, student, and stakeholders can form a community in which specific learning processes take place. The community concept derives from Lave and Wenger (1990; Wenger, 1998), who conceptualize this learning process in society or, in the words of Barab and Duffy (2000, p. 49), "giving the students a legitimate role (task) in

society through community participation and membership." This approach of three-way partnerships is also acknowledged by Tynjälä and colleagues (2003), who characterize it in the following way: "Responsibility is shared amongst the stakeholders, but the student has a key role in determining his or her own needs and aspirations. […] It also increases value conflicts both within and across stakeholding institutions, exposing differences in expectations and experiences … A traditional control-oriented system in which student learning is predetermined by the academic staff and subject boundaries does not work" (Tynjälä *et al.*, 2003, p. 157). Scholz and Marks (2001) proposed a transdisciplinarity studio where scientists and practitioners cooperate for a certain period of time, practicing and developing transdisciplinary research.

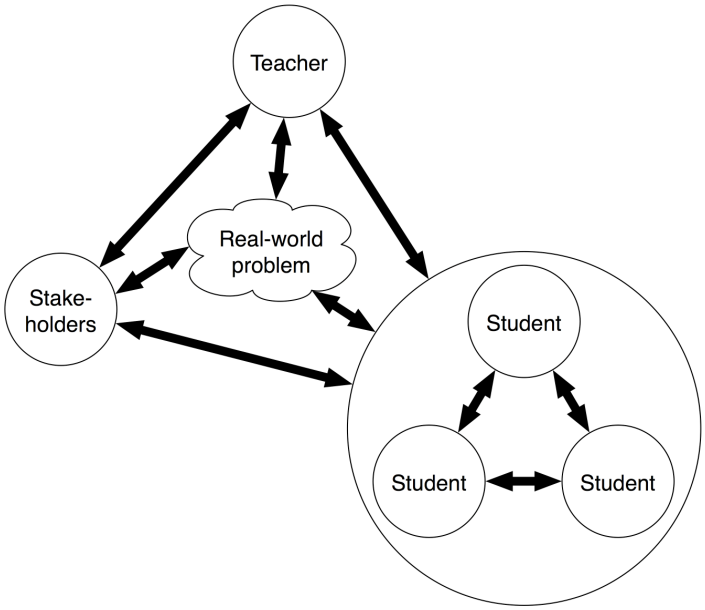

Figure 10. Stakeholders are involved in the problem-solving process.

It follows from the previously presented material that it is not enough that students learn how to research complex problems. The embeddedness of real-world problems into a societal context as well as group processes in the research team have to be taken into account. In the following section we will introduce the socio-cultural constructivist approach and project-based learning as a framework that responds to some of these challenges.

2 Socio-cultural constructivism and project-based learning as didactical framework

In response to some of the previously mentioned challenges in teaching and learning, a renewed discussion on activating students emerged in the late 1980s, almost a century after the first ideas were put forward at the beginning of the 20th century by John Dewey, who advocated "learning by doing" (Dewey 1902, 1910, 1915). We will outline some of the fundamentals here and introduce the "socio-cultural constructivism" and one of its didactical concretization "project-based learning."

2.1 Socio-cultural constructivism

We start from a socio-cultural constructivist perspective, taking students as active learners who are responsible for developing their knowledge. Individuals actively construct knowledge in a specific social setting (Resnick, 1987). This understanding of learning goes back to the works of Jean Piaget (cf. *e.g.* 1954), describing knowing as a balance between what is familiar and what is novel. We organize the world by ourselves and according to our existing knowledge and experiences; i.e., we must "construct" our own knowledge. The term "cognitive constructivism" normally denotes this perspective, which was extended by Lev Vygotsky (cf. *e.g.* 1978), who claimed the importance of social context for learning, and who introduced what was later termed "social constructivism." Bruner (1966, 1990) developed the theory further, paying more attention to the political, cultural, and social context; "socio-cultural constructivism" can be named this position. In the most radical form of constructivism, von Glasersfeld (1995) refuses the idea that knowledge can represent any independent, "objective" reality and that we do have no possibility to validate it. The core ideas of these perspectives were taken up by Berger and Luckmann (1966), who claimed that "reality is socially constructed." This happens, in fact, in our everyday interactions: for example, with our peers, relatives, and accidental encounters, an idea developed by the "social interactionists" (Blumer, 1996; Goffman, 1967).

In the context of education, Wilson and Meyers (2000, p. 69) describe this as a process of mutually developing a shared understanding: "Construction of meaning is tied to specific contexts and purposes. People develop shared ways of responding to patterns and features in particular contexts." The

situational character of learning was described by De Miranda (2004, p. 69), who states that "ways of knowing are strongly connected to the social, cultural and physical situations students experience in learning." Communication plays a very important role in the process. The students have to come into direct contact with a problem and be given the opportunity to construct their specific views of the situation: "Cognition is mediated by social interaction and cultural practice and […] language, literacy, and discourse are both tools and products of cognitive, social, and cultural practice" (Moje *et al.*, 2001, p. 471).

Altogether, this implies that two of the previously mentioned challenges are addressed:

> (1) The societal context or "embedding" of learning is taken into account. Tynjälä *et al.* (2003, p. 153) assert that "the constructivist view of learning and cognitive research on expertise also provide important arguments for integrating education and work".
>
> (2) Learning is understood as an activity, implying an active role for the student. Students are active learners, interacting with others. Knowing is conceived of as an activity, not as an abstract entity (Barab and Duffy, 2000, p.28). Learning becomes a goal-oriented process rather than an incidental outcome (cf. Bereiter and Scardamalia, 1989).

We face some important challenges when translating this model into didactical and pedagogical forms (see Tynjälä, 1999, p. 366): (a) the need to develop instructional methods that take into account the situational nature of learning, and (b) the learners' previous knowledge, beliefs, conceptions, and misconceptions, which strongly affect their reactions. From this, it already becomes obvious that teaching based on the social-constructivist view is a challenging endeavour. "It requires a great deal of effort on the part of both teachers and students. In addition to a strong knowledge base in their subject matter domain, teachers need knowledge about the processes of learning" (Tynjälä, 1999, p. 425). Students who are not used to this kind of learning have to "learn to learn" first. This includes learning to communicate and cooperate during the learning process, and actively constructing knowledge by carrying out tasks (Tynjäla, 1999, p.365).

Most adaptations of these learning theories into concrete curriculum development address lower educational levels or high school; however, "the constructive approach to learning is most appropriate for advanced learners, that is, university students and adults. […] Universities are communities for producing knowledge and, as a matter of fact, scientific activity in its very nature is a constructive learning process. Therefore, creating constructive learning environments for university students is in harmony with universities' other mission, conducting scientific research" (Tynjälä, 1999, p. 366); however, only a few concrete examples exist of universities of the 21st century (for an overview, see Abd-El-Khalick *et al.*, 2004). Much can be learned from the developments in the field of project-based learning, a concept we turn to now.

2.2 Project-based learning (PBL)

There are many different realizations of socio-cultural constructivism in education, but most share some key values (Land and Hannafin, 2000, pp. 11): the centrality of the learner in defining meaning; the importance of situated, authentic contexts; the negotiation and interpretation of personal beliefs and multiple perspectives; and the importance of prior learner experiences in meaning construction. As diverse as the concepts are the names used in referring to them. We use here a very common term, project-based learning (in German "Projektmethode", Frey, 1982), being aware that other concepts like *e.g.* problem based learning "share assumptions about active, constructive, and authentic learning" (Jonassen, 2000, p. 91). Project-based learning (PBL) has been discussed and advocated by various authors (see *e.g.* Barab and Duffy, 2000; Dohn *et al.*, 2003; Hodges, 2005; Kyvgaard Hansen, 2003; Leroy *et al.*, 2001; Stärk, 2001; Tynjälä, 1999). PBL has its historical roots in progressive education in Germany between 1895 and 1933 ("Reformpädagogik", *e.g.* Hermann Lietz, Georg Kirchensteiner), the pragmatism in the United States (John Dewey, William H. Kilpatrick), and the worker's schools in Russia (Pavel Blonskij and Anton Makarenko)[14].

On a general level, "project-based teaching privileges experience with an understanding of knowledge-building processes over the conceptual

[14] For a comprehensive overview cf. *e.g.* Frey, 1982, pp. 26-43.

understanding of particular established theories" (O'Neill and Polman, 2004, p. 234-5). "The basic idea of PBL is that the starting point of learning and studying is a problem that needs to be solved. The courses are structured around problems rather than subjects or disciplines, and practical experiences are integrated with theoretical material" (Tynjälä, 1999, p. 427). The integration of practice and theory as pedagogical innovation is therefore guided by the problem and not by a theoretical model. "The focus […] is the question or issue, the case, the problem, or the project that learners attempt to solve or resolve" (Jonassen, 2000, p. 90). A central aspect is the start from a problem definition, emphasizing the investigation and inquiry of the problem (cf. Abd-El-Khalick *et al.*, 2004, p. 413, Barab and Duffy, 2000, p. 30-31).

The concept of practice plays an important role. PBL tries to "engage students in investigating a real-life question or problem that drives activities and organizes concepts and principles; involves students, teachers, and members of society in a community of inquiry as they collaborate about the problem" (Schneider *et al.*, 2002, p. 411). This also has effects on the learning process: Interests of the project partners from outside the university have to be taken into account, resulting in more integrated, and long-term units of instruction (Jonassen, 2000, p. 91).

Moje *et al.* (2001, p. 469) summarizes the characteristics of PBL thus: "The features…include (a) questions that encompass worthwhile and meaningful content anchored in authentic or real-world problems; (b) investigations and artefact creation that allow students to learn to apply concepts, represent knowledge, and receive ongoing feedback; (c) collaboration among students, teachers, and others in the community; and (d) use of literacy and technological tools." Crucial is, of course, the choice of the problem that drives the learning process. It must be ill-defined to allow individual framing and increase intrinsic motivation through problem ownership (cf. Barab and Duffy, 2000, p. 32-33 and Jonassen, 2000, p. 91).

Naturally, the teacher's role is different from traditional pedagogical settings. It changes from providing the correct information that has to be memorized by the student to being a much more complex "facilitator" (Hofstein and Lunetta, 2004, P. 40), "supervisor" (Kyvgaard Hansen, 2003, p. 179), or "coach" (De Miranda, 2004, p. 73). S/he is responsible for guiding the students within the set boundaries of the temporal,

methodological, and scientific requirements. One of his/her most important tasks is to provide feedback and space for reflection processes appropriate to the students' needs. S/he takes control only when needed and hands the responsibility back to the students as soon as possible (Brown and Palincsar, 1989). The teacher is no longer a content expert but, more importantly, an expert of learning and problem-solving processes. S/he has to use this expertise to coach the students in a participatory manner (Barab and Duffy, 2000, p. 32). This new complex role of the teacher (Hofstein and Lunetta, 2004, p. 33) also implies that the teacher gets more involved with the problem and the students: "The process of supervision can be very labour-intensive and it is easy for the supervisor to be more involved, simply because the problems are exciting and of practical relevance" (Kyvgaard Hansen, 2003, p. 179).

To manage this complex process, Hofstein and Lunetta (2004, p. 38) stress the importance of learning goals to act as a guiding concept during the process: "To guide teaching and learning, it is very important for both teachers and students to be explicit about the general and specific purposes of what they are doing in the classroom."

In summary, some of the core principles of project-based learning can be named as follows: (a) focus is the case or the problem that students try to define and solve, and the problem drives the learning process; (b) learning is cooperative, with students working in groups and with people from outside academia; (c) students plan and conduct the research, and communicate their findings as a team, and group processes and their management become important. Hence, we can conclude that many of the challenges to university teaching presented above can be answered. The domain area alone remains: ill-defined problems prevail in environmental sciences and ask for a specific research methodology. The transdisciplinary case study (TdCS) is based on the PBL framework but also addresses the domain issue. We will now introduce our own approach.

3 The transdisciplinary case study (TdCS)

The TdCS started in 1994, with the results published yearly in a book (for the first see Scholz *et al.*, 1995; for the most recent one see Scholz *et al.*, 2004). Within the five-year master program, the TdCS is a compulsory

course for students in the ninth semester, running 18 hours a week for 14 weeks. 36 to 120 students participate each year. The TdCS is based on the previously introduced concepts. For our own approach, we use the term *functional socio-cultural constructivism*, emphasizing the essential role of functions. Two theories underlie our approach. One is the probabilistic functionalism (Brunswik, 1955; Hammond and Steward, 2002; Scholz *et al.*, 2006), describing any behaviour as intentional or purposeful and thus *functional*. The other is the theory of human-environment systems, which acknowledges that behaviour is governed by certain drivers, needs, or motives (Scholz and Binder, 2003), and both their elicitation and fulfilment is dependent on the socio-cultural context. The functional and intentional aspect has already been brought up by the pioneers of learning such as Gagné (1974), Bruner (1966), and Piaget (1954).

3.1 The case study concept of TdCS

For persons with a didactical or pedagogical background, the term "case study" can be misleading. In a classical case study, a past event is analyzed by students using a well-prepared set of literature and other material (Barab and Duffy, 2000, p. 30-31; Frey, 1982, p. 206-207; Hodges, 2005, p. 101; Jonassen, 2000, p. 91). Our understanding of the term "case study" has been unfolded in the seminal work by Scholz and Tietje (published in 2002), who present a research methodology to address complex cases based on different case study approaches in the fields of neuropsychology, educational sciences, law, business, and environmental sciences (see Scholz *et al.*, 2006). "Case study" refers here to a research-based learning methodology in a transdisciplinary setting. Embedded case study methods are learned in our course similarly to other research-based teaching courses (see *e.g.* De Miranda, 2004; Hofstein and Lunetta, 2004; Moje *et al.*, 2001; O'Neill and Polam, 2004; Schneider *et al.*, 2002; Tynälä, 1999; Tynjälä *et al.*, 2003). As such, we address the first challenge to university learning developed above: the complex nature of the environmental problem under study.

3.2 Learning goals in transdisciplinary case studies

On a didactical or pedagogical level, our approach shares many of the peculiarities of project-based learning: we start from a case, expect the students to organize the project and their learning process by themselves, and foster group work. As the TdCS addresses specifically the issue of

sustainable development, it goes beyond project-based learning. This can be illustrated for all three domains introduced above:

> *Subject area domain*: Complex and multi-faceted real-world problems are ill-defined, where neither the initial nor the target state is sufficiently known (Scholz *et al.*, 1997). Therefore, the whole project has to be *method-driven*: knowledge integration and complex problem-solving are organized through a set of well-established and approved methods, which form the core competence taught in the subject area domain (Scholz and Tietje, 2002).
>
> *Process domain*: Working in groups of ten to fifteen students, intense communication with stakeholders, and multi-criteria assessments with stakeholders are central principles of the TdCS. Knowledge of group processes becomes important, as well as general management skills (Stauffacher, 2001).
>
> *Societal context domain*: In contrast to interdisciplinary research, our study goes *beyond science* through transdisciplinary research (Gibbons and Nowotny, 2001; Scholz, Mieg and Oswald, 2000; Scholz, 2000; Scholz and Marks, 2001; Scholz and Stauffacher, 2001). Coordinating a transdisciplinary research project is the core competence taught in this domain (transdisciplinary research poses difficult methodological problems, which are addressed elsewhere; see *e.g.* Scholz and Stauffacher, 2001; Stauffacher and Scholz, 2004).

Consequently, learning goals go beyond that of project-based instruction (Table 14). The learning goals of the TdCS are organized according to the three domains of teaching challenges introduced in the first chapter: subject area, societal embedding, and group processes. As can be seen in Table 1, communication processes between the three participants of the learning process--teacher, partners from outside university, and students--play a key role in TdCS, *e.g.*, organizing assessments, integrating knowledge, joint problem definition, ongoing communication, etc. In our view, this holds for sustainable development conceptualized as ongoing inquiry (Laws *et al.*, 2004) in general. Many of the learning goals are essential for this process and, therefore, constitute important prerequisites for sustainability learning. In the following discussion, we will focus on this part of the learning goals

because they form a core element and are the most important critical success factors for a TdCS. We will illustrate these communication processes from the teachers' and students' points of view.

Table 14. The learning goals in the transdisciplinary case study at the ETH Zurich.

Subject area domain: Complex problem solving	Understand and define relevant aspects of the case.
	Describe and think in different future states, options, and scenarios.
	Organize scientifically-based assessments of future scenarios.
	Integrate knowledge by the embedded case study methods.
Process Domain: Group processes	Use tools to facilitate group processes.
	Reflect on and optimize group processes.
Societal context domain: Transdisciplinarity	Joint problem definition
	Ongoing communication with stakeholders.
	Organize mutual learning.
	Contribute to case development.
	Reflect potentials and limits of transdisciplinarity.

3.3 The new role of the teacher

Essential for an efficient and successful learning process are teachers, called tutors in the TdCS. They take the role of a coach, point out envisaged obstacles, show possibilities to react on, and guide the learning process of the students. Tutors only take control when necessary but primarily hand over responsibility to the students themselves whenever possible (Stauffacher, 2001).

3.3.1 The tutoring concept in the TdCS

Starting in 1994, our first teaching concept relied heavily on different expert roles (Mieg, 2000). This means that we had a team of four senior researchers for each group of approximately 20 students applying a team-teaching concept (Scholz, 1978). They were coming from private research institutions, consulting companies, and from the university. In principle, they followed a teaching model like the supervision of a doctoral thesis, primarily focusing on the content level. Over the years this concept was adapted, and the members of the team each took over specific roles (method, content, didactics, etc.), placing more emphasis on the teaching aspects (Stauffacher, 2001). At the moment, we have only one tutor per student group of ten people, which is not too few, according to De Miranda (2004,

p. 73): “By learning to create climates that foster cooperative learning, it becomes possible to help students engage in active problem solving and reflection even though there is only one teacher and many students.”

We have learned that tutors have to be chosen carefully: The key to success is that they understand the TdCS methodology, transdisciplinary research, and project-based learning. All our tutors have themselves completed the case study as students in preceding years and are, therefore, familiar with the applied research methodology and the project organization. Before the term, they all get an intense training. In this training, they are presented with some of the peculiarities of the TdCS in learning and research. To activate the tutors, they are working in groups of two to three, to discuss anticipated challenges and promising responses. Going through the whole process of the fourteen weeks, concrete experiences are exchanged among experienced tutors and newcomers who have participated as students. In our experience, this knowledge transfer from one year to the other and the yearly consideration from the students’ perspectives is much more promising than formal training in didactical methods. This is not surprising as tutoring can only be learned by doing it and reflecting on experiences made. The tutors are coached by two project leaders, both experienced tutors who have worked with individual student groups in earlier years. Likewise, the learning process of the tutors is facilitated and supported.

In the process domain, the teacher is responsible for guiding the students, and the students have the responsibility to plan and carry out the project. The tutor, in his or her role as a coach, accompanies the group, advises the students with respect to upcoming difficulties, and shows possible solutions. This balance between scaffolding and fading is crucial for the success of the role of the tutor: “Fading consists of the gradual removal of supports until the students are on their own” (Collins *et al.*, 1989, p. 483). “Scaffolding is meant to support the learner in working in the practice field by providing the learner with the necessary support to undertake complex problems that, otherwise, would be beyond his or her current zone or proximal development” (Barab and Duffy, 2000, p. 33). The tutors are, in the first two weeks, responsible for the planning, management, and controlling of the project. They show the students how it is done practically (“modelling”, see Collins *et al.*, 1989). If the students demand support or if the tutor considers it necessary, interventions have to be made. Here, the concept of scaffolding

is used. The intervention of the tutors spans from short formal lectures to process reflection and meta-communication with the students.

During the whole semester the tutors ensure that the students reflect on their work, the group dynamics, and their achievement of learning goals. Consequently, their goal is to ensure that learning by reflection takes place (Collins *et al.*, 1989) and that the students apply the knowledge they have learned before the case study ("exploration", see Collins *et al.*, 1989). At the end of the case study the tutor conducts a one-on-one feedback discussion with every student, resulting in a written job reference.

In the societal context domain the role of the tutor is to help the students in contacting case representatives outside the university to acquire them as project partners. The tutor accompanies the students in their interactions and gives them detailed feedback on their behaviour.

In the subject matter domain the tasks of the tutor are to communicate the state of the art in TdCS methodology, making sure that students apply it correctly, and to perform a first quality control before the project leaders review the group's results.

3.3.2 Group processes as central challenge of TdCS

The majority of the challenges, difficulties, and insights for the students in the TdCS lie in the process domain of the project. Group processes within the student's group, between the students and the transdisciplinary partners, and with the teachers play an important role, and facilitating group processes became a primary focus of our learning goals. Last but not least, it has been shown that those students learn most "[who] focus on the underlying learning process rather than project outcomes (*e.g.*, grades, teacher approval)" (Ertmer *et al.*, 1996, p. 722). Facilitation and controlling of group processes in the TdCS is supported by a set of effective techniques and methods, like team-building tests (Kyvgard Hansen, 2003), synthesis moderation (Scholz and Tietje, 2002), techniques for the facilitation of group discussions (Lipp and Will, 1998), computer-assisted group work (Stauffacher *et al.*, 2001; Hansmann *et al.*, 2004), visualization techniques (Lipp and Will, 1998), feedback and meta-discussions (Frey, 1998), and activity journals (Kyvgard Hansen, 2003).

Within the process domain it has to be recognized that a group cannot start directly on the content level (Cohn, 1975). Quite on the contrary, at the beginning the group consists of single individuals. In a first step the students get to know each other before getting a sense of working collectively in a group. Only then can the content work actually start. Tuckman and Jensen (1977) differentiate the following phases, which we use also as rough references for tutors' interventions (Stauffacher, 2001):

> *Forming*: In the first week the students arrive in the group and need orientation about the upcoming process. The tutor has to take a strong lead to give the students security within the new situation.
>
> *Storming*: After getting comfortable with the group, the students push forward their own interests. The tutor has to ensure that all group members are equally respected and can express their interests.
>
> *Norming*: In weeks 2 to 4 the group's norms and codes of conduct have to be established. The tutor has to take a strong position on behalf of the group as a whole so that common responsibilities can be taken care of.
>
> *Performing*: Now the content work can effectively start. The role of the tutor changes to coaching approaches and methods. In this phase the students work in subgroups, which can then be established very quickly and efficiently.
>
> *Adjourning*: During the last weeks, reflection of the group process becomes important again. The tutor's role is to ensure a continued learning process from the experiences made.

A group can only start working in the performing phase, but enough time has to be assigned to the preceding phases. On the students' side this leads to the impression of inefficiency in the first weeks of the TdCS and accordingly to the demand for decisions from outside or from the tutor regarding the concrete project plan. This is, of course, a simplistic model; in reality, these very phases are developing every single day and are sometimes hard to discern from each other. Still, we consider that this is one of the central learning goals of the TdCS: experiencing that group processes are difficult, delicate, complex, sometimes thrilling, exhausting, and, last but not least, that they do need time and attention.

3.4 The new role of the student

3.4.1 Self-regulated learning and individual functions

The role of the teacher is not the only different and demanding one; the role of the student also differs significantly from traditional expectations in universities. Above all is the responsibility of the student to take an active role in learning. The students have to get actively involved with the requirements of the project and plan their time accordingly. This also entails that the individual students take over specific tasks and identify with them.

To structure the student groups internally, different "offices" and responsibilities are defined and assigned, some in a rotating scheme:

> *Workflow coordinator team*: For a period of two weeks, the workflow team plans the tasks that have to be accomplished, the milestones that have to be reached, and how any special events are to be organized. They design a detailed plan for the week to come according to the project's overall goal. The team facilitates group discussions, is responsible for a first control and quality assessment, and coordinates tasks, responsibilities, and events. The team is responsible for making sure any necessary decisions are made.
>
> *Logistics office*: The person responsible for logistics administrates the cash box, the keys to the rooms, transportation, office equipment, etc.
>
> *Editors*: Two students from each group are responsible for the timely completion of all written reports. They do a final proof and are responsible for the coordination of the parts from different subgroups.
>
> *Content manager*: One person is responsible for keeping the content management system of the group up to date and well structured (Hansmann *et al.*, 2004), on both computer and paper.

In every group there are also other informal roles that some students take over. Nevertheless, these roles are important for the work of the group. If they do not form spontaneously, it is the duty of the tutor to make sure that there is someone who takes care of that specific aspect: *e.g.*, a photographer, who documents the work progress; an internet specialist, who can easily

find relevant information; a socially concerned person, who organizes the group's social events; and an exact scientist, who constantly questions the results.

3.4.2 Choosing the case is crucial for students' motivation

Expecting students to involve themselves in a self-regulated learning process and invest a lot of time requires, above all, an intrinsic motivation. Ownership is the key term when it comes to the motivation of the students. The most crucial aspect here is the choice of the case: "The question is also chosen to be meaningful to students by being connected to their own lives or community, allowing them to take ownership of the question and leading them to do investigations" (Schneider *et al.*, 2002, p. 411). To serve as a basis for active learning, the problem also has to leave room for the framing of the students: "It is important to present learners with interesting, relevant, and engaging problems to solve. Problems should be ill-constructed, so that some aspects of it are emergent." (Jonassen, 2000, p. 91). Barab and Duffy (2000, p. 33) stress this aspect, too: "The dilemmas in which learners are engaged must either be ill-defined or defined loosely enough so that students can impose their own problem frames…It is in this inquiry into ill-structured dilemmas that ownership and learning occurs…Students must be introduced to the context of the problem and its relevance, and this must be done in way that challenges and engages the student."

3.4.3 Students' reactions to TdCS

On the side of our students, we have learned that not all have welcomed TdCS learning. From year to year, the portion of those who were enthusiastic and very positive fluctuated from half to two-thirds (see Figure 11). On the other hand, a sizable number of students were always reserved or even reluctant. This was, however, to be expected as resistance against project-based learning happens quite often, especially in a context where right and wrong, passed and not passed, and straightforward performance indicators prevail (Frey, 1998, p. 278). Other authors in the field came to similar conclusions: "Students often seek the most expedient and least demanding approaches to learning that enable them to pursue their social objectives more thoroughly…Students know that the real object of learning is comprehension and memorization of ideas…This contradiction between real and expected learning outcomes may represent the greatest impediment to learning" (Jonassen, 2000, p. 117-8).

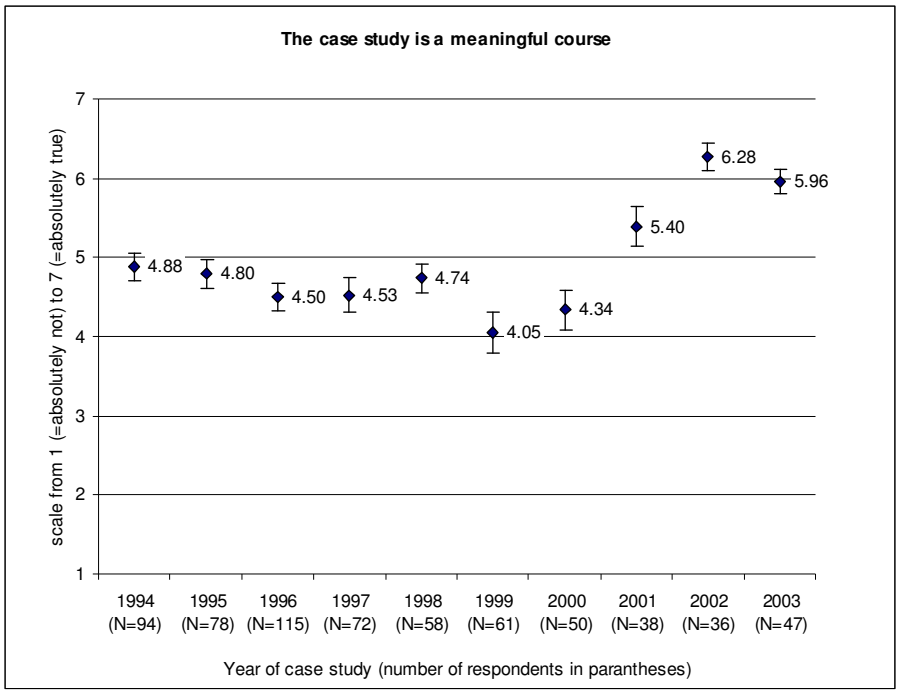

Figure 11. Results from students' evaluation of the TdCS at ETH Zurich (given is mean and respective standard error of mean of 7 point scale).

Nevertheless, one of the major problems is neglecting this unfamiliarity and basic resistance. As Tobias (1992, p. 206) puts it, "Prior knowledge may be less than ideal for creating a truly adaptive instruction, but not dealing with it explicitly is clearly a major problem." There is a need to explicitly deal with these shortcomings, but it is mostly ignored that this method of learning also requires that the students match the special demands of this method. Ertmer and colleagues (1996, p. 722) stress that "it is important for case instructors to be aware of students' responses and approaches to the case method and to provide support for those who are intimidated, reluctant, or unprepared to engage in these unfamiliar and ambiguous learning tasks." Much more effort will have to be placed into these facts, either by promoting more project-based learning approaches in the whole curriculum or by explicitly addressing these peculiarities and differences within our course.

Lately, some of our students are commenting on the efficiency and efficacy of the case study as a learning instrument--again, something that has been discussed in the literature: "Students participating in activating instruction often advance more slowly in their studies than students taking part in

traditional courses" (Tynjälä, 1999, p. 425). In contrast to these statements, an empirical study on a national level in the United States actually produced the opposite result: "The PBS [project-based science] students scored significantly higher than students nationwide on many items. Even compared with groups that traditionally score higher on achievement tests (middle-class and white students), on average the PBS students, including minorities, outscored the national sample on almost half the items" (Schneider *et al.*, 2002, p. 419-20).

4 Conclusions

As we have shown, case study learning is very demanding and challenging, both for students and teachers. Much can be learned from literature, yet one's own experiences are required since context is different, as are the individual competencies, knowledge, and affinities of the project leaders in charge. We will first present some general conclusions on the teaching procedure, and later specify some lessons from the viewpoints of the teacher and the student.

4.1 Goal-oriented learning as guiding concept

As the TdCS approach poses many challenges to teachers and students, it is very important to define clear and transparent learning goals that are communicated, discussed, and reflected continuously. The learning goals of the TdCS are clearly assignable to three different learning domains, thereby giving the students the chance to find their own focus and letting them decide what they want to learn. Clearly, the students cannot be expected to reach excellence in all domains; therefore, we propose a balanced approach, striving for a sufficient performance in all domains. A decisive role plays a didactical contract (Brousseau, 1984), which defines different roles, expectations, and responsibilities and is negotiated in the very beginning. It is here that a balance between students', project leaders', and involved stakeholders' goals has to be found. In our view, a reasonable learning effect can only be expected if at least partial responsibility for the case and its future development is taken over: The students should become owners of the problem.

4.2 A more complex teacher-student relationship

The relationship between the tutor and the students is marked by a much more complex interaction than in normal university education. There are high expectancies on both sides, with a strong emphasis on negotiation and reflection. The students as well as the tutors have to legitimate their actions and expose them to discussion. This mode of interaction does not fit very well into a standard university formation; students and tutors first have to accustom themselves to this procedure. It is also at conflict with the traditionally very hierarchical structures in university education, which frequently leads to procedural insecurities. Even the classical roles of teacher and student get blurred when students work directly on the case, gathering knowledge that they subsequently have to explain to the tutor.

4.3 Teachers

The teacher as tutor is exposed to many different demands and many possible roles. There is no clearly structured approach to how a tutor should behave in every possible situation. This also depends to a great degree on the focus the tutor wants to put on his or her own profile; yet, the demands upon them are far from trivial, and the selection of teachers is a crucial step in setting up a case study. As evidenced from the literature, and as we also experienced well in practice, group processes are crucial in the TdCS. Hence, we dedicated quite a lot of resources into this field and made the facilitation of group processes a part of our major learning goals. Skills in this domain play a crucial role in the choice of tutors.

The concrete modus operandi has to be defined and developed in an ongoing inquiry between the tutor and the student group. The tutor is very often the subject of unconcealed critique from the students' side, a phenomenon unknown to most university teachers. His ability to treat this feedback rationally and constructively, and to act as a mediator between the students' interests and the TdCS requirement is crucial to preventing loss of motivation on the students' side. An important task of the tutor is also the responsibility to reserve a substantial amount of time for reflexive processes in the group, which has proven to be a critical success condition for the attainment of the learning goals.

It has to be noted that the difficult job of tutoring is poorly rewarded from a traditional science perspective. Although it is the policy of TdCS that PhD

students working as tutors should write an article about the case study, there are many parts of the tutor role that do not fit into the requirement profile of a disciplinary science career.

4.4 Students

From the students' point of view, the TdCS is a completely new environment with a spectrum of unknown challenges. There are pressures from many sides: peers, transdisciplinary project partners, the project leaders, the tutor, and the learning goals. The students perceive themselves as being in the middle of these pressures.

The intrinsic motivation of the student to face these challenges is critical for a successful TdCS. According to our experience, the most decisive aspect is the selection of the case: The students have to identify with the case and the guiding questions of the TdCS in order to acquire problem ownership.

One considerable problem is posed by the misperception of students toward their own learning process. The students continuously underestimate their progress in the societal context domain as well as in the process domain. It remains to be seen how this potential misperception can be dealt with or how learning achievements can be better communicated. One promising approach would certainly be the application of a learning journal: "Journal writing seems to be especially effective in developing students' metacognitive or reflective skills" (Tynjälä, 1999, p. 371).

Regarding the students' response, we came to the conclusion that you actually need to accept that students will be more critical than they would be in normal lectures. We expect more from them, and they expect more from us. Making explicit the novel requirements and learning approaches used in the case study actually helps. Many students are socialized to regard learning as comprehension and memorization of facts. In the case study, students have to acknowledge that learning is more and that it involves active participation throughout the project. Continuous reflection of the learning process is necessary and has to be supported by the tutors, who ask for regular progress reviews and give individual feedback.

5 Outlook

Much of what we have presented might sound trivial; however, we put much work into developing and refining all these properties. All in all, one could call this a professionalization process of the TdCS. We have learned that transparency and consistency are essential for our project, both for our external partners and also for our students. A perfect organization, a transparent timetable, and the whole process being well structured by our case study methodology helped quite a bit in gaining more clarity and providing confidence in a very complex project. An ongoing and strict quality control guaranteed successful completion of the work, but also allowed concrete feedback to the students about their achievements.

Hand in hand with our ongoing improvement of the case study, one important element of a project-based learning environment became faded in the most recent years: Give students enough room for their own ideas, for their own framing of the problem. We were too much inclined to achieve good project results and, with the help of our long years of experience, knew beforehand how we would tackle the problem under study. This prevented students from playing an active role in defining the project goals and therefore taking over problem ownership. We will address this in our forthcoming case studies.

We are convinced that our transdisciplinary case study or courses like it are important for universities at the present time. Societal and environmental problems are generally of a complex nature, calling for an encompassing and integrated approach, involving actors from outside and inside universities, and applying methods for knowledge integration. This holds of course, not only for environmental sciences but as well for medicine, nanoscience and others. Even more, under present budget restrictions and a wide-ranging mistrust of society toward universities, there is a necessity for a new contract between society and research: Students should learn to take over responsibility in societal contexts and be able to communicate beyond the “ivory tower.”

We want to conclude with a quote from two proponents of new approaches in university learning: “It is easier and more efficient to maintain current practices than to promulgate approaches for which significant shifts—epistemological, technological, and cultural—are required” (Land and

Hannafin, 2000, p. 16). Case study learning is indeed more challenging; however, it is also more satisfying!

VI Discussion

We start this section with a short recapitulation of the three presented case studies. We will then discuss some major lessons learned focussing on the question of the role of science in TdCS and aspects of public involvement in TdCS.

1 Short recapitulation of the three case studies

1.1 TdCS as a tool for sustaining traditional industries in regional clusters

We documented a two-year transdisciplinary project on the transition management processes of regional clusters in textile, timber and dairy industries in the Swiss Canton of Appenzell Ausserrhoden. This canton is a rural pre-alpine area, which has been historically shaped by traditional industries and which lies in the vicinity of St. Gallen in the Greater Zurich Area. Scientists and regional stakeholders collaboratively planned, assessed and discussed how to realize cooperative business strategies in order to sustain a continued presence in their selected industry. 101 stakeholders participated in a project, which made use of the Area Development Negotiations method. This systematic and analytical method involved (a) the construction of different regional business strategies and clustering variants through Formative Scenario Analysis, (b) a multi-criteria evaluation of these variants and (c) a multi-stakeholder consensus process on different forms of horizontal and vertical cooperation. As a result, a regional learning process with the ultimate goal of moving towards a sustainable development form was initiated between industries, public authorities and research institutions.

1.2 TdCS as a tool for collaborative planning of sustainable tourism development

Sustainable tourism development can be perceived as prototypical example for collaborative planning in sustainable development. Such planning processes necessitate analytic and systematic methods like *e.g.* stakeholder based multicriteria analysis. We were documenting our Area Development

Negotiation method within a transdisciplinary case study design for a STD in the Seychelles (total land area of 455 km^2 and 81'202 inhabitants in 2001) on La Digue Island with a surface of 9.8 km^2 and roughly 2000 inhabitants. Key questions were (a) what form of tourism is possible and how these are evaluated from different scientific perspectives and by present tourists and the local community; and (b) how our transdisciplinary case study approach can be used to support a STD. We concluded that our approach helped unravelling existing trade-offs in STD and induced an ongoing mutual learning process towards sustainable development on La Digue.

1.3 TdCS as tool to learn researching environmental problems from a socio-cultural constructivism perspective

The transdisciplinary case study at the Institute for Human-Environment Systems at ETH Zurich combines education, research, and application on large-scale problems in the interaction of human-environment systems. This chapter focused on teaching aspects and discussed the TdCS as a further development of project-based learning at the university level. First, we presented challenges to university teaching in environmental sciences addressing complex real-world problems, such as sustainable development. Next, we introduced the perspective of socio-cultural constructivism as a didactic and epistemological foundation for project-based learning, which sees students as active learners responsible for developing their own knowledge. TdCS is considered a learning framework based on the principle of self-regulated learning; i.e., students must actively deal with the requirements as well as plan and execute their project work within their own worldviews and goals. TdCS methods are essential as we tackle complex real-world problems. We discussed challenges and obstacles of such an approach and presented lessons learned since 1994, on both the viewpoints of students and of teachers. We concluded that TdCS learning is a demanding task, especially in a transdisciplinary context where more challenges emerge than in project-based learning, since goals of teachers, stakeholders, and students have to be balanced.

2 Transdisciplinary research: challenges for science collaborating with industry, administration, and the public

2.1 Balance between researchers' and practitioners' autonomy necessary

The role for science in transdisciplinary research is distinct to disciplinary and interdisciplinary research. As transdisciplinary researcher, we have to balance between on one hand methodological rigor and soundness; and on the other hand transparence and understandability for non-university persons. We have to do the splits between scientific credibility – generally gained by publications in peer reviewed journals – and practical relevance of the process and the results – gained in intense and extensive field work. Even more, such close collaborations between science and society can endanger researchers' autonomy. Researchers and persons from science are on equal footing in a TdCS and issues to be researched will be jointly defined. This brings about that sometimes questions will not be studied due to the resistance from the side of the partners. It is, however, vital that results gained in TdCS will be published whatsoever they are. In this respect, the researchers' autonomy has to be respected. To this end, clear agreements have to be set at the beginning of a project considering this delicate issue.

Looking at collaboration between science and society from the other side, the practitioners' autonomy is at stake, too. Practitioners often fear that researchers will try to influence decision making and thus penetrate legitimate democratic processes. In our understanding of TdCS, researchers are not to act or to decide but to research the issue at hand. The division of labour between science and practitioners remains but "transverse communication and interaction between actors" is strengthened (Shinn, 2005, p. 731). That means, the researchers' role in TdCS is distinctive to *e.g.* in action research (see for three different forms of research-practice relationship in educational sciences: Scholz, 1978).

2.2 New form of knowledge production proclaimed by different scholars

New roles for science have been discussed in the literature since the 1990s. We will discuss three most prominent examples – post-normal science,

mode 2 science and triple helix – and illustrate how TdCS can be understood against this background.

2.1 Post-normal science

Funtowicz and Ravetz (1993, p. 739) coined the term of 'post-normal science' that emerged in "response to challenges of policy issues of risk and the environment". They distinguish between two dimensions of a scientific problem: knowledge and values (*ibid.*, p. 744). If decisions stakes or scientific uncertainty is high, neither applied research nor professional consultancy is adequate. Here 'post-normal science' becomes necessary. This form of science "involves the inclusion of an ever-growing set of legitimate participants" (*ibid.*, p. 752). For Funtowicz and Ravetz (*ibid.*, p. 753) "post-normal science is complementary to applied science and professional consultancy". Yet, Funtowicz and Ravetz are far from giving practical advice how 'post-normal science' would look like or work. In our view, TdCS can certainly be seen as an exemplary case for the required methodology.

2.2 Mode 2 science and mutual learning

A new mode of knowledge production has been proposed in the mid 1990s by Gibbons, Nowotny and colleagues (see *e.g.* Gibbons *et al.*, 1994). According to Gibbons and Nowotny the so called 'mode 2' science has rapidly evolved besides 'mode 1' science. Whilst the former is transdisciplinary, problem-solving oriented, standing in a societal real-world context and uses robustness as important quality criterion, the latter is monodisciplinary, oriented towards pure science in an academic context and strives for reliability. In 'mode 2', scientific experts and expert knowledge from outside universities should meet up in an agora, a kind of marketplace of ideas and knowledge (Nowotny *et al.*, 2001). In our view, there is a need of adequate institutional facilities, through which such a science-science dialogue can be established. Scholz and Marks (2001) proposed a 'transdisciplinarity studio' where scientists and case-agents cooperate for a certain period of time and then going back to their proper working context. Hence, Scholz and Marks maintain existing boundaries and division of labour between science and practice. A mutual learning process among science and society should become possible (Scholz, 2000; Scholz *et al.*, 2000). This stands in contrast to Gibbons and Nowotny, who are blamed to be 'anti-differentiationists' (Shinn, 2002, p. 604). Our TdCS offers such an

institutional framework offering opportunities for intense collaboration but not affecting the professional home of those involved.

2.3 Triple helix

A last concept in this line is the so called 'triple helix of innovation' (see *e.g.* Leydesdorff and Etzkowitz, 1996; Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2000). According to this concept, "the university can play an enhanced role in innovation in increasingly knowledge-based societies." (Etzkowitz and Leydesdorff, 2000, p. 109). In this model, tri-lateral networks of academia, state and industry work together on innovation processes. In contrast to Gibbons and Nowotny, Etzkowitz and Leydesdorff illustrate that this networked form of science pursuing practical interests is not new (*ibid.*, p. 115). In fact it has been the dominating form of science up to the late 19th century (*ibid.*, p. 116). Only after the Second World War, the model of 'pure science' became prevailing (*ibid.*). At least in the TdCS on rural industries, this triple helix model has been followed.

In short, we can conclude that TdCS is a methodology in line with some latest developments documented by philosophers and sociologist of science. Though the researchers' autonomy might be endangered in the TdCS, we stress the importance of still following the division of labour but offering new intensive forms of collaboration on well and jointly defined issues. This – at least for latest generations of researchers – new form of knowledge production has a great impact on required skills for our students; the TdCS offers in this respect a response, too.

3 Collaboration as a key but a functional-dynamic understanding necessary[15]

The actual collaboration among researchers and practitioners is crucial and challenging. As we have shown, the TdCS methodology offers a means to initiate, manage, and foster such collaborative efforts. In the literature such collaborative processes are normally dealt with under the heading of 'participation'. Thus we will discuss some major insights gained from the

[15] Parts of this chapter are based on a paper written in collaboration with Pius Krütli, Thomas Flüeler and Roland W. Scholz

last decades' literature in this field. Furthermore, we will discuss our own contribution to these discussions, a functional-dynamic understanding of public involvement.

3.1 Collaboration in research literature

It is often unclear and disputed what is actually understood by the term 'participation' (see *e.g.* Arnstein, 1969; Beierle and Cayford, 2002; Rowe and Frewer, 2005; Renn, 2005). Hence, we will look at it from different perspectives with a view to generate broad insights.

3.1.1 Various traditions in discussing 'participatory approaches'

At least three distinct forums can be found where the pros and cons as well as concrete guidelines for implementation have been debated: (i) in political sciences, the discussion of deliberative democracy (for an overview, see *e.g.* Bailey and Braybrooke, 2003; Bohman, 1998; Chambers, 2003; Delli Carpini *et al.*, 2004;); (ii) in planning sciences, the discussion of advocacy, communicative, participatory, collaborative, or deliberative planning (Davidoff, 1965; Forester, 1989, 1994, 1999; Healey, 1998, 1999; Innes, 1998; Sager, 1994, 2002; Smith, 1973; Willson, 2003); and (iii) in risk sciences and environmental decision making, the discussion of participatory risk assessment and participatory decision making (Beierle and Konisky, 2000; Beierle and Cayford, 2002; Fiorino, 1990; Laird, 1993; Renn *et al.*, 1993; Renn, 1999; Rowe and Frewer, 2004, 2005; Stern and Fineberg, 1996; Webler, 1999). It is in the latter two traditions that our TdCS is situated. We see TdCS as collaborative planning method that follows a systematic-analytic approach in the framework of stakeholder based decision analysis.

3.1.2 Why public involvement?

Different lines of reasoning are offered to justify why collaboration should be supported. Fiorino (1990) distinguished between three major forms: (i) normative, (ii) instrumental and (iii) substantive. (i) The first refers to the democratic ideal that 'citizens are best to judge their interest' (*ibid.*, p. 227; see *e.g.* the works of Robert Dahl discussed in Bailey and Braybrooke, 2003). In the field of sustainable development, this is normally referred to as 'Eigenkompetenzthese': concerned people are the best experts for their problems and their needs (see *e.g.* Gethmann, 2005; Heinrichs, 2005). (ii) According to the instrumental reasoning participation should guarantee increased legitimacy of policy decisions countering the crisis of confidence

in decision making processes (Fiorino, 1990, p. 228, see as well Chambers, 2003, p. 316). (iii) On substantive level, *e.g.* risk researchers stress that "lay judgments about risk are as sound or more so than those of experts" (Fiorino, 1990, p. 227; see as well *e.g.* Renn, 2005). We prefer to argue primarily along the last line of reasoning. Within the TdCS, we aim at a mutual learning process integrating knowledge and values from different backgrounds – researchers as well as experts from society and public at large. This seems obligatory for present complex environmental and societal problems with high scientific uncertainties and high level of decision stakes (Funtowicz and Ravetz, 1993).

3.1.3 Different forms of collaboration

Far more disputed than the actual reasons for collaboration are the different meanings that can be attributed to it. Since the 'ladder of citizen participation' by Arnstein (1969), several typologies of public involvement have been proposed (see *e.g.* Bishop and Davies, 2002; Catt and Murphy, 2003; Pretty, 1995; Rowe and Frewer, 2005; Webler, 1996, 1999). Arnstein (1969) herself distinguished eight levels of public participation classified within three groups according to the degree of empowerment: non-participation (manipulation, therapy); degrees of tokenism (informing, consultation, and placation); degree of citizen power (partnership, delegated control, citizen control). In our view no conclusive typology has yet been developed (Krütli *et al.*, 2006). This would entail at least the following: which groups should be involved (experts, stakeholder groups, public); by which information flow (one way, two way); giving what degree of power (full power to public, equal power for all, none to public); and what is the objective of the process (final result like *e.g.* improved decision making or learning during the process). Even more, the often met understanding of 'one technique belongs to one type of participation and is hence adequate in a given context' is in our view questionable and does not acknowledge the dynamic character of collaborative processes.

3.2 A functional-dynamic understanding of public involvement

Confronted with the often found static understanding of 'public involvement', generally in the form 'the more the better', we scrutinized our own experiences within the TdCS. We found that the intensity of public involvement, that means the contributions by practitioners, varied over time. We want to illustrate why we find this dynamic understanding essential.

3.2.1 Static understanding prevailing but insufficient

We use an adopted distinction of public involvement based on the general idea of increasing degree of empowerment by Arnstein (1969): information, consultation, active involvement, collaboration and empowerment. We consider information and consultation as rather weak forms of public involvement. These forms have generally a non-committal character. More up the ladder, we have activating forms of involvement which require a commitment but give binding power to the input. The range varies from two-way communication and discussion (active involvement) to collaboration. In the latter, participants will be responsible for the progress of process and output on equal footing. On the upper end, public will be empowered, giving it full power over content and process.

The importance of a dynamic understanding of public involvement can be illuminated if we refer to two prototypical patterns of public involvement found in literature. The 'expert approach' is strictly limited to expert persons. The problem is perceived as a technical one and therefore to be solved exclusively by technical experts. Public involvement is generally limited to information and consultation. The counterpart is the 'grassroots approach' where public is fully empowered all the way during the process. In the context of many present environmental problems with complex scientific problems containing many uncertainties and at the same time multiple stakeholder groups affected, it is to be expected that both approaches fail.

3.2.2 Functional-dynamic understanding in the TdCS

To illustrate our dynamic understanding, we combine different intensities of public involvement with a detailed process plan of our TdCS (see Figure 12). Each phase of the TdCS has its specific and adequate form of public involvement. To give one example: in the scientific system analysis, practitioners can actively be involved to gain qualitative insights into the functions of the system. However, due to the character of the method applied – using terms like *e.g.* 'impact factors', 'direct and indirect impact', 'activity/passivity' – major part of the work will remain within the university. On the other hand, we have phases in the project, where practitioners *e.g.* are deciding on potential follow-up with no major input from the side of research. In fact, no process of a complex decision-making problem just needs one level of public involvement; it will rather span

different levels at different points in time. The level of involvement of the public depends on the phase and its specific goals – a functional-dynamic approach.

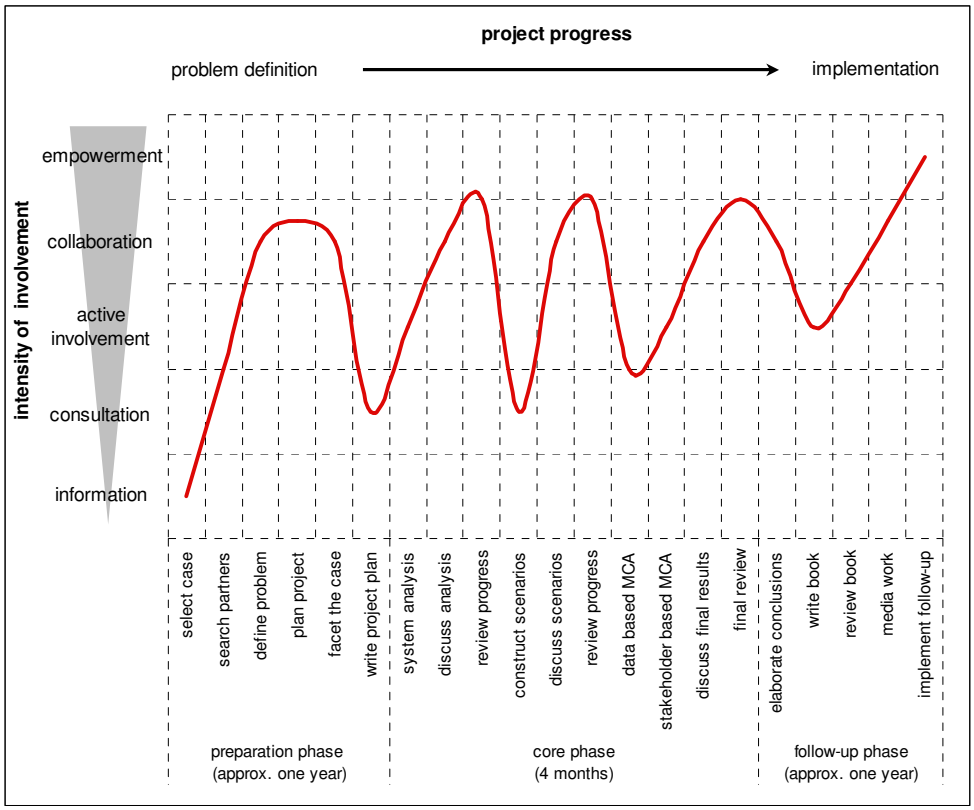

Figure 12. Varying degrees of public involvement in the TdCS.

VII Conclusions

We conclude with some reflections on TdCS as a specific institutional arrangement of neocorporatism and potentials of such negotiated forms of policy making in Anglo-Saxon cultural heritage. Before that, we would like to stress that TdCS actually works in different contexts. This can well be illustrated by Table 15.

Table 15. Eleven years of TdCS at the ETH Zurich and tentative estimations of number of persons involved (adapted from Stauffacher and Scholz, 2004).[16]

Year	*Case and topic*	*Students, scientists from university*	*Stakeholders from society*
1994	Grosses Moos (former Marshland): Sustainable agriculture	138	164
1995	City of Zurich: Industrial site Sulzer Escher-Wyss: Re-integration of an industrial site	128	135
1996	City of Zurich: Centre Zurich North: Sustainable urban development	173	75
1997	Region Klettgau: Sustainable soil use	140	206
1998	Region Klettgau: Regional development	108	144
1999	Swiss Railway Company: Eco-Efficiency in entrepreneurial action	94	74
2000	Swiss Railway Company: Freight transport	78	121
2001/02	Appenzell Ausserrhoden: Landscape development	69	122
2002/03	Appenzell Ausserrhoden: Future of traditional industries in rural agglomerations	56	91
2003/04	City of Basel: Leisure mobility	90	212
2004/05	City of Basel: Railway station dynamics	80	250

Besides these regular annual case studies; further similar projects have been implemented in the Seychelles (see above), in Sweden, Germany and Austria.[17]

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[16] The author of this thesis was involved from the very beginning of the TdCS. In the first six years he served as coach for individual student working groups and as of the year 2000 he was co-leader of the overall project.

[17] See the International Network on TdCS http://www.uns.ethz.ch/translab/itdnet

The success of our TdCS can most probably be attributed to its systematic approach both in addressing (i) public involvement and (ii) the actual decision making problem. (i) It is our strong conviction that only in a functional-dynamic way, public involvement can pay its dividend. This holds not only for transdisciplinary research – the cooperation between research and society – but in our view as well for public involvement in general environmental decision making processes like *e.g.* radioactive waste management; land use and landscape development; mobility and urban development. (ii) TdCS can be perceived as a collaborative planning method in an analytical and systematic decisions analysis framework: stakeholder input is documented and can be followed in the further process, hence transparency of stakeholder participation is guaranteed. TdCS enables negotiation and deliberations among different stakeholders and can thus induce a mutual learning process on future development. As such it offers a means for societal learning in sustainable development.

1 TdCS as an institutional arrangement for neocorporatism?

We started from the following overall questions: how can neocorporatism look like at a meso-level and is it successful in sustainable development? The TdCS is surely no neocorporatist arrangement in the still common and classical understanding of neocorporatism, focussing mainly on existing structures that allow negotiation of wages and working conditions among national business confederations and trade unions. On the other hand, we can look at it from the more general definition by Shonfield (1965, p. 231) that in corporatist economies, "major interest groups are brought together and encouraged to conclude a series of bargains about their future behaviour". In this sense, the TdCS can be understood as an institutional arrangement for neocorporatist regimes. This holds especially if neocorporatism is "understood in terms of networked form of governance" (Molina and Rhodes, 2002, p. 324). We concur therefore with Dowes (1996) that in a process understanding of neocorporatism, such a multi-stakeholder process for sustainable development is similar to interest mediation in a neo-corporatist regime.

Sustainable development involves not only economic wealth but considers as well environmental and societal aspects. Therefore in contrast to classical neocorporatist arrangements in TdCS a much large number of stakeholder

groups have to be involved and multiple outcome criteria reviewed. In contrast to the often hierarchical and elite approach of neocorporatist regimes giving the national state level ample importance, TdCS is applied locally. It is the regional level, where social networks are strongest – i.e. mutual trust exists – and hence negotiations among diverging views are possible. The importance of trust as cultural resource for neocorporatism has been stressed by Bornschier (2005b, p. 334). Generalised trust is a prerequisite for the generation of social capital (Bornschier, 2000, p. 381) and facilitates innovations and their diffusion (Bornschier, 2005b, p. 338; Bornschier, 2005c). Trust plays therefore a pivotal role in collaborative processes such as TdCS or other neocorporatist arrangements. If trust is not available it needs to be obtained – a hard and time consuming process in all our TdCS. It is well documented in the literature that in fact trust is much easier lost than built (see *e.g.* Anheier and Kendall, 2002; Delhey and Newton, 2003; Granovetter, 1985; Nuissl, 2005).

We conclude that TdCS can be understood as institutional arrangement for neocorporatism. However, more important than classical neocorporatist structures are certainly the general dynamic patterns of negotiated and deliberative processes. This is in line with conclusions by Molina and Rhodes (2002) who stress the importance of deliberative process of learning in understanding neocorporatism.

2 Convergence or polarisation in the new societal model?

In the pertinent literature Anglo-Saxon liberal democracies are normally referred to as counterpart to the neocorporatist regimes (see *e.g.* Bornschier, 2005b; Bornschier, 2005c; Hicks and Kenworthy, 1998; Lijphart and Crepaz, 1991; Siaroff, 1999). According to Bornschier (2005b, pp. 334-335; Bornschier, 2005c) countries on the lower end of the neocorporatist scale, show an uncoordinated pattern of a great number of interest groups. Interest mediation here is not systematically followed as in negotiated capitalism. In his longitudinal studies, Bornschier (2005b, p. 345) showed a more pronounced polarisation between Anglo-Saxon regimes and the neocorporatist regimes in recent times. With respect to our main subject, this raises the question if TdCS or similar neocorporatist arrangements are possible in the Anglo-Saxon cultural heritage. As we have not implemented

the TdCS in the US or UK, we are forced to refer to the literature to tackle this question.

To our knowledge, Ortwin Renn and colleagues are among the very few European researchers who actually have implemented a similar approach in the US context (Renn, 1999). The methodology developed by Renn and colleagues (Renn *et al.*, 1993) is called 'cooperative discourse' and has been successfully executed in Germany and Switzerland in the 1980s and 1990s. The model entails three steps (Renn, 1999, pp. 3050-3051): (1) identify and select concerns and evaluative criteria from stakeholders; (2) identify impacts and consequences related to different policy options; and (3) conduct a discourse with citizens and interest groups about the results of step (2). According to Renn, the application in the US context was not as successful as in Europe: "While participants in Germany and Switzerland were almost grateful and pleasantly surprised that someone made the effort to preplan and structure a procedure for their participation, U.S. citizens distrust prefabricated participation models and suspect hidden agendas with such an approach" (*ibid.*, p. 3053). He goes on by stressing that the "social climate of distrust, of government agencies and their contractors is partly expressed as skepticism toward new procedures." (*ibid.*). Based on this experience, one could argue that in fact negotiated forms of policy making face difficulties in the Anglo-Saxon world. This view is as well expressed by Offe (cited in Dowes, 1996, p. 184), who claims that Anglo-Saxon approaches "generate more conflict than can be managed by the state because of overparticipation and an overload of political issues".

On the other hand, a more inclusive way of policy making has been promoted by different US state agencies (*e.g.* Environmental Protection Agency, Department of Energy, see Beierle and Konisky, 2000; Beierle, 2002); US research institutions (see *e.g.* the report of the National Research Council edited by Stern and Fineberg, 1996); and we find in the research literature numerous accounts of participatory, collaborative, discursive processes involving public at large or different stakeholder groups in the US (see *e.g.* Fiorino, 1990; Laird, 1993 and the 239 cases of public participation evaluated by Beierle and Cayford, 2002; Beierle, 2002). Among the 239 cases, 23% fell in the most intensive category of participation 'negotiation and mediation' (Beierle, 2002, p. 743). In fact these most intensive processes were producing "higher-quality decisions" (*ibid.*, p. 747). In short,

on a meso-level it is hard to claim that negotiated forms of policy making are not possible in the Anglo-Saxon context.

Hunold (2001) critically reviews the proposed affinity between deliberative forms of policy making and neocorporatist patterns of interest mediation. He concludes that recent changes in US public administration have in fact "produced some convergence among formerly distinct styles of corporatist and pluralist interest representation" (*ibid.*, p. 159)[18]. To back this argument, he refers to the field of environmental policy making. According to Hunold (*ibid.*, p. 163) both pluralism and corporatism adapted their political system. Corporatism is now more inclusive not just involving interest group leaders; and business and labour peak organisations. Additionally it became as well more open. On the other hand, at least in the field of environmental regulation, a 'critical pluralism' evolved. Yet, he emphasizes (*ibid.*, p. 165) that this adapted from of pluralism "appears to arise in response to a collective action dilemma, not because participants feel responsible for a public interest".

Chambers (2003) attributes these changes to a deliberative turn in democracy (p. 307; see as well *e.g.* Delli Carpini *et al.*, 2004). She notices that the state is not any longer directly fixing a problem but rather guaranteeing "fair procedures through which citizens fix a problem" (*ibid.*, p. 312). In our view, the TdCS can certainly be used as an exemplary means for more deliberative forms of policy making. With Bornschier (2005a, 2005b) one could argue that here socio-institutional adaptations towards the new societal model become visible; affecting in fact both major regimes – the neocorporatist and the Anglo-Saxon. If this will lead to convergence or polarisation remains a question that needs to be answered empirically.

[18] This often found confrontation of corporatism with the term 'pluralism' has been criticised by Bornschier (2005b, p. 335).

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Curriculum vitae

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